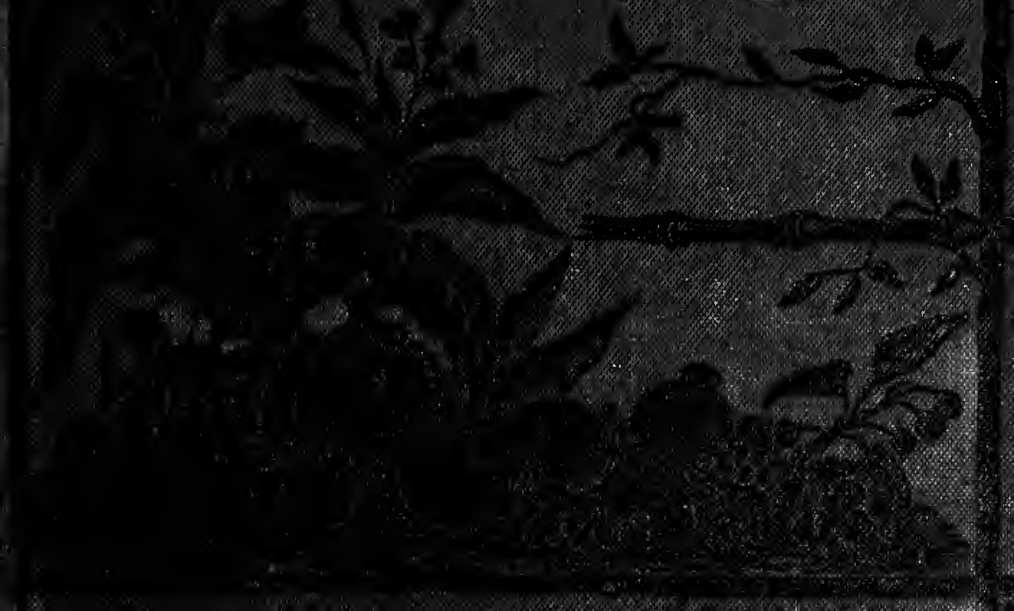


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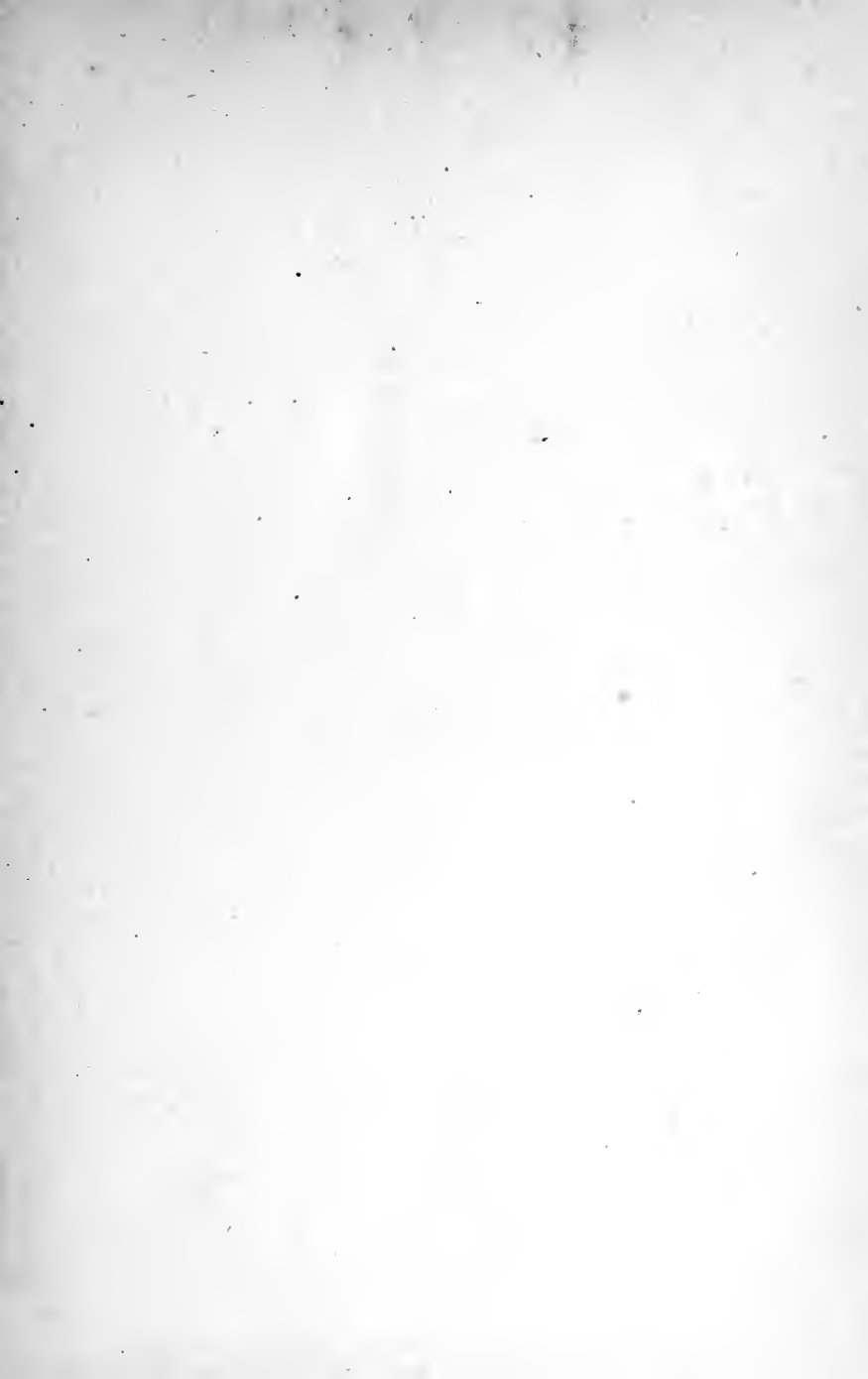
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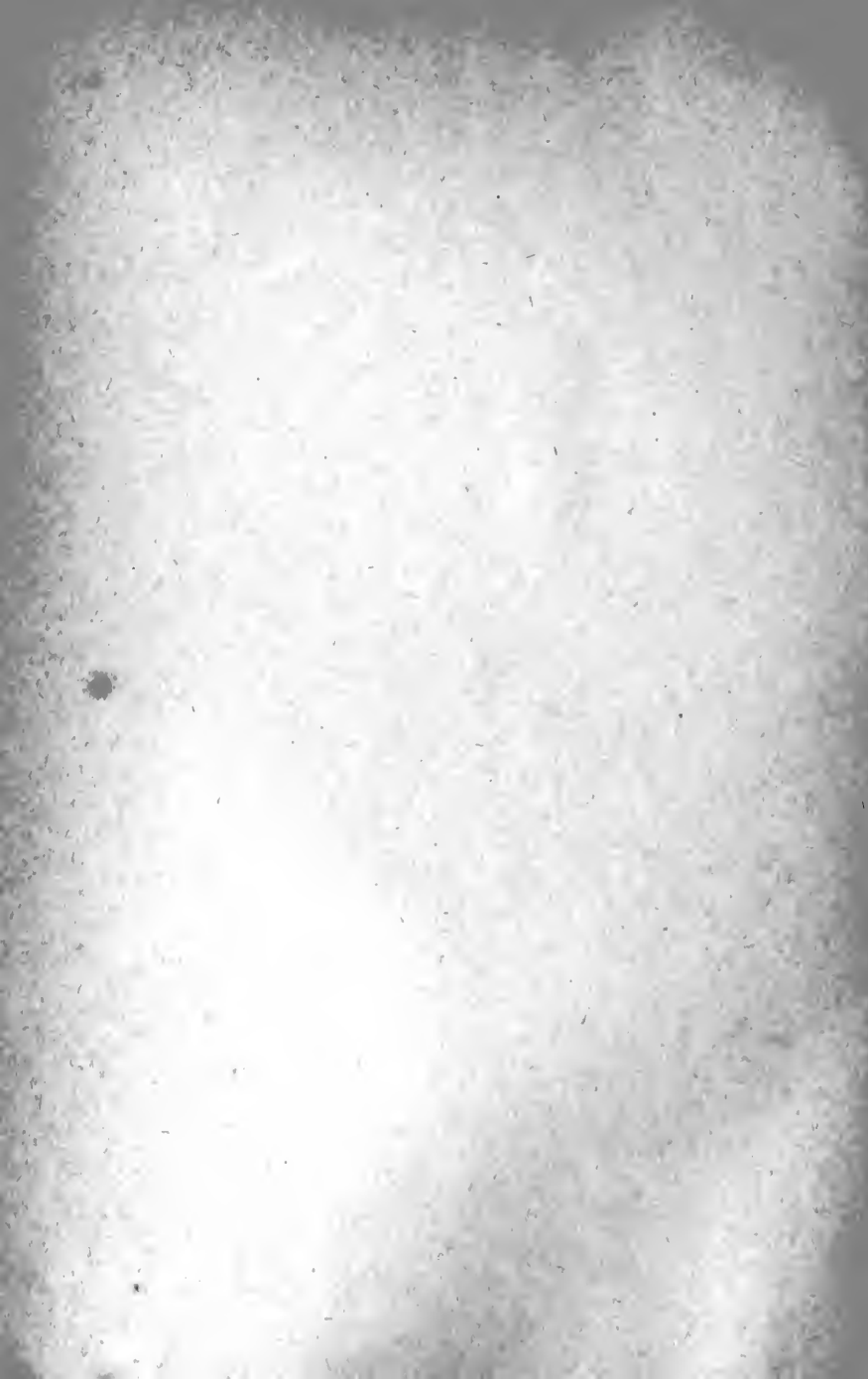
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*Marshall P. Wilder*

# AMERICAN FARMING

AND

## STOCK RAISING,

WITH

### USEFUL FACTS FOR THE HOUSEHOLD,

DEVOTED TO

FARMING IN ALL ITS DEPARTMENTS, INCLUDING ROTATION OF CROPS, DRAIN-  
AGE, FERTILIZERS, ENSILAGE, THE DAIRY, ORCHARD, VINEYARD  
GARDEN, DOMESTIC ANIMALS, THEIR BREEDING, MANAGEMENT,  
AND DISEASES; BEES AND THEIR MANAGEMENT, FISH CUL-  
TURE, SILK CULTURE, ARCHITECTURAL DESIGNS FOR  
HOUSES AND OTHER FARM BUILDINGS, IM-  
PROVED SANITARY CONDITION OF  
COUNTRY HOMES, Etc., Etc.

Edited by

CHARLES L. FLINT,

SECRETARY OF THE STATE BOARD OF AGRICULTURE OF MASSACHUSETTS FOR TWENTY-EIGHT CONSECUTIVE YEARS, AND  
AUTHOR OF "GRASSES AND FORAGE PLANTS," "MILCH COWS AND DAIRY FARMING,"  
"MANUAL OF AGRICULTURE," EDITOR OF "HARRIS ON INSECTS," ETC.

WITH

### AN APPENDIX

BY

MANLY MILES, M.D., D.V.S., F.R.M.S.,

FORMERLY PROFESSOR OF AGRICULTURE IN MICHIGAN AGRICULTURAL COLLEGE, AUTHOR OF "STOCK BREEDING,"  
"SILOS, ENSILAGE, AND SILAGE," ETC.

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Illustrated with over Six Hundred Engravings.

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COMPLETE IN THREE VOLUMES.

### VOLUME II.



NEW YORK:

CASSELBERRY COMPANY.

1892.

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PRINTERS AND BINDERS. }

TO

HON. MARSHALL P. WILDER,

PRESIDENT OF THE AMERICAN POMOLOGICAL SOCIETY.

THE ENLIGHTENED AND LIBERAL FRIEND AND PATRON

OF

AGRICULTURAL AND HORTICULTURAL PROGRESS IN AMERICA,

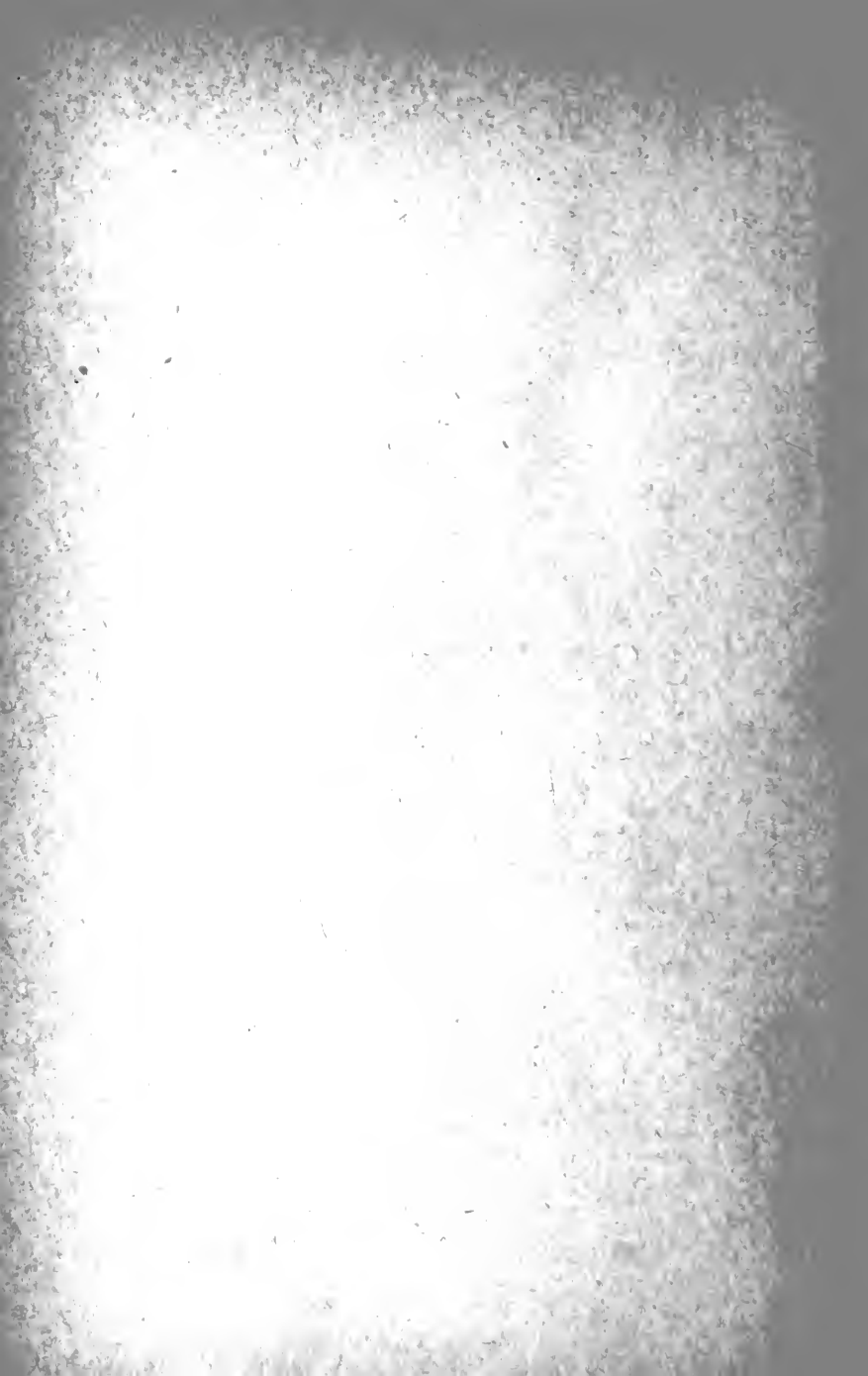
*This Work is Respectfully Dedicated*

BY

THE AUTHOR.

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# BIOGRAPHICAL SKETCH OF MARSHALL PINCKNEY WILDER.

By CHARLES L. FLINT.

Few men in our community have made a more striking, or a more durable mark than Hon. Marshall P. Wilder. Few have held more important public positions, or sustained themselves more honorably in them through so long a course of years. It has fallen to the lot of few men to initiate so many public enterprises which have enured to the benefit of the people among whom they have lived.

Born in the town of Rindge, N. H., on the 22d of September, 1798, he received his christian names from Chief Justice Marshall, and General Charles C. Pinckney, at that time prominently before the public as a distinguished Federalist statesman. His father, a nephew of the Rev. Samuel Locke, D.D., after whom he was named, was for thirteen years a representative in the New Hampshire Legislature; his mother, Anna, a daughter of Jonathan and Mary (Crombie) Sherwin, was a lady of great moral worth, to whom, no doubt, he owes many of the striking features of his character. His paternal grandfather was one of the seven delegates from the county of Worcester in the Massachusetts Convention, called to ratify the Constitution of the United States in 1788, who voted for its adoption.

At four years of age Marshall was sent to school, and at twelve entered the New Ipswich Academy, his father desiring to give him an education with reference to a profession. At sixteen, his father gave him the choice to fit himself for a farmer, a merchant, or for college. He chose the first, but the business of the store, which his father kept in the town, increasing, he was taken into that, where he soon acquired habits of industry, and developed such mental and physical energy that he was taken in as a partner at the age of twenty-one, and soon became postmaster of the town.

Conscious of a capacity for a wider field of action, he removed to Boston in 1825, and began business in Union Street, under the firm name of Wilder & Payson, afterwards Wilder & Smith in North Market Street, and finally set up for himself on Central Wharf. Forming a partnership again in 1837, he passed through several progressive steps to the well known and prosperous firm of Parker, Wilder & Co, now located in Winthrop Square. He is therefore the oldest commission merchant in domestic fabrics in active business in Boston. Though compelled, like all business men, to pass through various crises of commercial embarrassment, he has the proud satisfaction of never having failed to meet his obligations. With him success was a duty, and he had as a gift from nature that inherent energy of character, and devotion to the ruling idea of his life, to enable him to resist the allurements to ease and personal comfort, and to strive, not only for material prosperity, but for a higher and nobler object, to make himself useful to mankind. His business capacity and his executive ability were early recognized. He was one of the original directors of the Hamilton Bank, and has held that position for more than fifty years, and that of Director of the National Insurance Company for more than forty years, and of the New England

Mutual Life Insurance Company for nearly the same length of time, to say nothing of prominent positions in other similar institutions.

But Colonel Wilder was never wholly absorbed in the pursuits of trade, or the acquisition of wealth. His early tastes, and his love for rural pursuits, led him in 1832 to remove to Dorchester, and devote his leisure hours to the fascinating study of, horticulture, and to experiments and investigations upon the land. His house, originally built by Governor Increase Sumner, was surrounded by extensive grounds, which he has brought by skill and taste to the highest state of cultivation, sparing no expense in the importation of seeds, plants, and trees, endeavoring by his example, as well as by precept and practical instruction, to instil into the public mind a love for labor upon the soil, and to elevate the standard of rural taste. His garden, his green-houses, and his forest trees and shrubs, filled up the time to be spared from other business, and gave ample scope for his favorite investigations, which he has continued, year after year, for half a century.

Soon after the formation of the Massachusetts Horticultural Society in 1829, Colonel Wilder was associated with General H. A. S. Dearborn, its first president, and from that time to the present he has been one of its most active and efficient members. The society early purchased the lands now known as Mount Auburn, for a cemetery and ornamental garden. Upon the separation of the cemetery from the society, in 1835, a change suggested by Colonel Wilder, committees were appointed, consisting of Judge Story on the part of the cemetery, and of Colonel Wilder on the part of the society, and though there were many difficulties to overcome, such was the skill and conservatism of Colonel Wilder, they were finally surmounted, and as a result, the society was soon able to erect an elegant hall on School Street, and subsequently the splendid building on Tremont Street, the most magnificent horticultural hall in the world. Chosen president in 1840, he held that responsible office for eight successive years. The hall on School Street was erected during his presidency. In his capacity as president, he headed a circular for a convention of fruit-growers, to be held in New York, October 10, 1848, when the American Pomological Society was formed and he was chosen its first president, an office which he has held to the present time.

In February, 1849, the Norfolk County Agricultural Society was formed, chiefly through the influence of Colonel Wilder, and he was chosen president, and delivered his first address upon agricultural education, the first general effort in that direction in this country. He held the position of president for twenty years. Soon after his first election to the office he issued a circular requesting a meeting, in convention, of delegates from the agricultural societies throughout the State to be held in September, 1851. This convention organized a Central Board of Agriculture, of which he was elected president and held the office till 1852, when it was organized as a department of the State, known as the State Board of Agriculture, of which he is still a member.

In 1863, the legislature incorporated the Massachusetts Agricultural College, in accepting the grant by Congress of public land scrip for the purpose, and Colonel Wilder was named first as one of its Board of Trustees. In 1852, chiefly through his influence, the United States Agricultural Society was established at a meeting held in Washington, and he was elected its president, a position which he held till the breaking out of the rebellion, when its annual exhibitions were necessarily discontinued.

Colonel Wilder took an interest, at an early age, in military affairs, and at sixteen was enrolled in the New Hampshire militia. At twenty-six he was commissioned Colonel of the Twelfth Regiment. This interest led him, soon after coming to Boston, to join the Ancient and Honorable Artillery Company. In 1856 he was chosen commander of the corps.

Though not a persistent aspirant for political honors, Colonel Wilder has not held himself aloof from public service. He was first elected a member of the legislature in 1839, as

a representative from the town of Dorchester. In 1849 he was elected a member of the Council of Governor Briggs, and the following year a member of the Senate and its president.

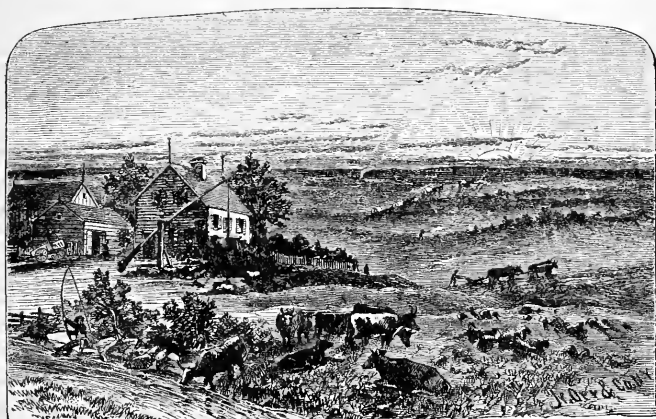
In January, 1868, Colonel Wilder was solicited to take the presidency of the New England Historic Genealogical Society, and was unanimously elected to the position, which he has since held with distinguished ability, delivering the annual addresses. Through his personal influence more than fifty thousand dollars have been raised to procure a new building for the use of the society, and to establish a fund for the support of a librarian. By his energy and untiring devotion to the interests of the society, he has infused new life and vigor into its efforts for the public good, and given it a reputation and an influence which it never had before. It is safe to say that no one else could have raised it to its present prosperous condition, or given it its extended influence and character in the community.

The Hon. Paul A. Chadbourne, late president of the Massachusetts Agricultural College, in a recent memoir of Colonel Wilder says that: "The interest which Colonel Wilder has always manifested in the progress of education, as well as the value and felicitous style of his numerous writings, would lead one to infer at once that his varied knowledge and culture are the results of college education. But he is only another illustrious example of the men who, with only small indebtedness to schools, have proved to the world that real men can make themselves known as such without the aid of college, as we have abundantly learned that the college can never make a man of one who has not in him the elements of noble manhood before he enters its halls." His writings, public speeches, and addresses now amount to very nearly a hundred in number, and they have shown such marked ability that Dartmouth College, as a testimonial of his services in science and literature, conferred on him, in 1877, the degree of Doctor of Philosophy.

Colonel Wilder has been peculiarly blessed and happy in his domestic relations. What man could have accomplished so much who had not been? In 1820 he married Miss Tryphosa Jewett, of Rindge, a lady of great personal attractions. She died July 21, 1831, leaving four children. On the 29th of August, 1833, he married Miss Abigail Baker, of Franklin, Mass., a lady of many accomplishments and marked piety, who died, April 4, 1854, leaving five children. On the 13th of September, 1855, he married her sister, Miss Julia Baker, an accomplished lady, by whom he has two sons.

Colonel Wilder is a prominent public benefactor. If he had done nothing else but to introduce the *Beurré d'Anjou* pear and great numbers of other new fruits and flowers, and to multiply varieties by hybridization, he would have laid the community under great obligations to him; but his range of activity has been far wider. A large part of the beauty, the cultured taste, and the luxuriance in landscape gardening, which cluster around and adorn the thousands of small homes about Boston, through a constantly widening radius, is due directly or indirectly, to his influence and inspiration. And now, at the age of eighty-four, from the calm retreat of his happy home, he can look back on a long life well spent, and out upon a region smiling with loveliness, with a consciousness that he is surrounded by a host of admiring and devoted friends, who can realize and appreciate the results of his labors, and the powerful impetus which his personal presence gave to the spirit of improvement, thirty, forty, fifty years ago.

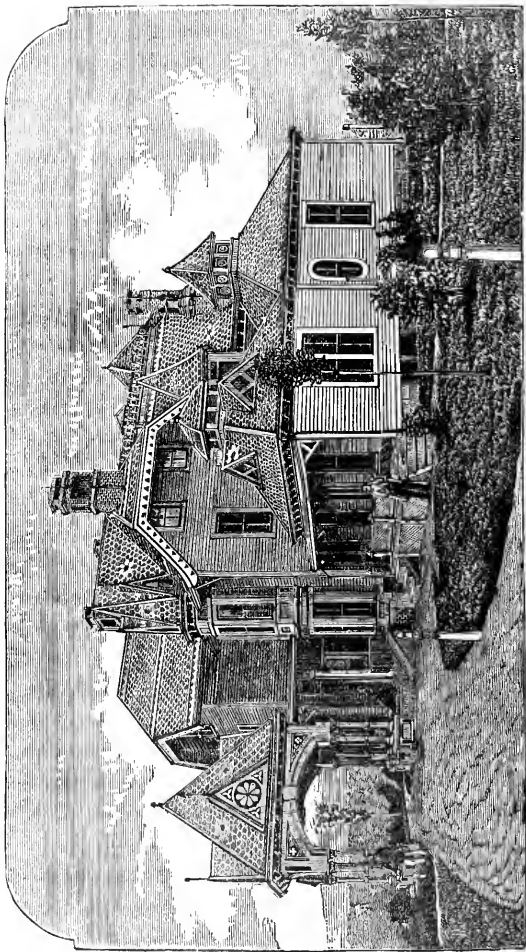




## FARM BUILDINGS.

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AS the degree of civilization attained by a people can be very accurately determined by the manner in which they till the soil, and the implements used for that purpose, so in like manner can the standard of civilization be measured by the kind of houses they construct for themselves and their domestic animals. The lowest types of the human family live in holes dug in the ground, burrowing like some kinds of animals, while savages of a little higher order than these construct rude huts, that are a slight improvement upon the former habitations. As intelligence and civilization increase, the style of architecture improves in a proportionate degree, until the habitations of the most intelligent nations of the earth are characterized by thrift, refinement, and taste; wealth, intelligence, and culture being as unmistakably evidenced by the style of architecture of such a nation, as by the customs and manners of the inhabitants themselves.



DESIGN FOR A COUNTRY HOUSE.

What is true of nations, is equally true of individuals, and the condition of the farm and farm buildings will, as a general rule, be an index of the thrift, enterprise, and refinement of the owner. Although there has been a great improvement in the construction of farm buildings of all kinds during the last quarter of a century, not only in the number adapted to the various purposes of farm use, but in the convenience and style of their construction, still, there is in many sections a great deficiency in these respects, which occasions much inconvenience and loss.

**Buildings Necessary on the Farm, etc.**—The number of buildings required on the farm will depend upon a variety of circumstances, such as the size of the farm, the purposes to which it is best adapted, the special departments of business to be conducted, the productiveness of the land, etc. A large farm will require more and larger buildings than a small one. Inasmuch as the family should have the first consideration above that of the domestic animals, of course the house should receive the first attention, and be considered the most important of all the farm buildings. It should have the most care and money spent upon it in rendering it healthful, pleasant, and attractive, while the barn should be secondary in this respect, although we know of some farmers who seem to regard their horses as first in importance, and wife and children as secondary, and who will be at great expense of money, time, and labor for the welfare of their stock, providing fine, comfortable barns, in which they seem to take much pride, while they are at the same time careless and indifferent with respects to the wants of the family, and provide for them a home comparatively much inferior in convenience, comfort, and general architectural construction to the barn. We are glad to know that this class of farmers is in a small minority, and yet such are by far too numerous, and wherever found will always be characterized by a lack of the essentials of true manliness and intelligence that are characteristic of farmers generally.

In many sections of the country it is necessary to provide shelter for the stock during a portion of the year, hence a barn is essential for this purpose, as well as for the storage of their food. Where large numbers and a variety of animals are kept, a stock-barn will be necessary for this purpose, aside from that for the crops constituting their food. In those parts of the country where cereals are cultivated to any extent, a granary will be essential for the safe storage of such crops. A hog-house will be indispensable on a farm where swine are kept, while the poultry-house, wagon-house, wood-house, or place of storage for fuel of any kind, store-house, tool-house, and repair-shop will be found equally necessary. Sometimes one building may be made to answer the purpose of two or three combined, on small farms, such as the wagon-house, tool-house, wood-house, etc., being different departments of the same building.

Aside from those already mentioned, the ice-house will be found a great convenience on every farm, and the source of supplying a luxury which, when once enjoyed for a season, will be regarded as a necessity. The expense and labor attending it is slight, compared with the benefits that may be received. On a dairy farm an ice-house is very necessary, as is also a milk-house, in those sections where there are no creameries or cheese-factories in the vicinity. These will not only prove a great convenience, but will contribute largely to the profits of such farms by improving the quality of the dairy products. Where tobacco or other special crops are exclusively cultivated, buildings adapted to the purpose will also be required.

If to the above, the farmer is so circumstanced that he can add a small conservatory, not as a necessity, but as a luxury, and a means of increasing the educating and refining influences of the home, as well as adding to its attractions, the money and labor thus expended would be found, wherever such a course is practicable, to be a profitable investment.

In the construction of all farm buildings, convenience and good taste should have due consideration. It costs but little more, at first, to construct a building that is convenient and tasty, than one that is lacking in these respects, while convenient buildings will prove the

cheapest in the end, by the vast amount of labor saved, that is always involved where buildings are wanting in this essential. Of course, good judgment and taste are necessary in securing such results, and while the one who plans the structure may possess the former, he may not the latter, for it is not every one who is endowed with sufficient taste to plan the artistic arrangement of a building, as will be seen by the attempts in this kind of art, exemplified by many of the buildings commonly seen upon the farm. In the construction of farm buildings, health, comfort, and convenience should have the first consideration, being of primary importance, while beauty of design and ornamentation, though of secondary importance, should not be entirely overlooked.

**Repairing and Painting Buildings, etc.** — In the architectural study of farm buildings, a recent writer has divided them into two classes, viz. : — “Those already built, and those which are to be built”; in other words, the old, and the prospective new. As the former are by far the most numerous, we will consider them first.

The importance of keeping farm buildings in good repair should not be overlooked by any farmer who has regard not only to the general thrifty and orderly appearance of his surroundings, but to economy as well. On every well-regulated farm, frequent repairs in buildings become a necessity in securing their preservation, and unless these necessary repairs are made in season, and thoroughly performed, the expense of repairing will be largely increased, and permanent injury to the buildings often be the result. If a leak in the roof of a building, or elsewhere, is promptly stopped, no injury is occasioned by it; but if neglected month after month the frame-work of the building will be liable to decay, and become after a little time so seriously injured as to be worthless. When buildings need painting, the sooner the new coat of paint is applied, the better. If too long neglected, the surface becomes rough by exposure to the weather, which will render the painting more difficult to perform, and also require much more paint to cover the surface well; hence, promptness in such cases is an economy in both the expense of labor and material.

Besides the economy of keeping buildings in good repair, their neat and orderly appearance is no small argument in favor of such management. Good work, promptly performed, is in all respects the cheapest. In painting buildings, two objects are secured, viz.: ornamentation and durability. Paint adds to the beauty of the buildings, and also tends to preserve the wood to which it is applied. Buildings that are kept well painted have a neat, attractive appearance, are an indication of the culture, refinement, and prosperity of the owner, and render home more pleasant to the family circle. Unpainted buildings have a dingy, neglected appearance, and will require a new covering of wood-work much sooner than those that are kept well painted.

In answer to the question, whether it will pay for the farmer of small means, and many expenses, to incur the additional expense of keeping his buildings well painted, we would say, that it depends upon various circumstances; if mere money value in benefits resulting from having well-painted buildings is considered, it will depend upon whether it will cost more to procure the paint necessary to preserve the wood-work than to newly cover the buildings when they need it.

In some sections, where lumber is cheap, the paint would be the most expensive; in others, where timber is scarce, the cost of timber and labor of re-covering would prove the most expensive. But the money value of things is not the only consideration to be involved. The attractions that may be added to the home by the outlay of keeping the farm buildings well painted, and in good repair, and the pleasure and satisfaction afforded the family, besides the refining and educating influence of pleasant surroundings, are considerations which it would be difficult to weigh by a money standard.

If farmers would take more pains to make their homes attractive and pleasant, and farm-life something better than the hard drudgery that it too commonly is, there would be more

respect and love entertained for farming, as an occupation, by farmers' children, and less complaint by farmers generally of being left to till the farm alone, in their old age. If farmers wish their sons to be attached to the farm-home, and farm-life, they must make that farm-home and farm-life sufficiently attractive to induce some of their boys to stay; and how can they make a better beginning than to commence right at home and first make the farm buildings neat and attractive? We are sorry for the farmer's son or daughter who feels ashamed to say to a stranger friend, "This is my home"; while it is refreshing to see a kind of pardonable pride manifested by children for their home. Home should be the dearest and most attractive spot on earth to husband, wife, and children, — attractive to both heart and eye, and in order to make it such, there is more responsibility involved individually in connection with each member of the household, than mere sentimentalism might include.

The home should be made attractive, — beautified. Money thus spent is capital well invested, and will bring larger returns to the farmer and his descendants, in real happiness, comfort, and elevating influences generally, than almost any other investment that could be made; and to those farmers who can make such a course practicable, we would say, spare no pains or reasonable expense in making your homes as attractive as possible.

The expense of painting may be greatly reduced by the farmer being able to perform the labor of applying the paint himself, instead of paying a professional painter to do the work for him. This was formerly in a great measure impracticable, on account of the lack of knowledge of the proper method of mixing paint; but the difficulty is now obviated by the use of what are called "mixed paints," which have for several years been in general use. These may be found in the market mixed in the proper proportions, ready for use.

Like white lead, and nearly everything else that is marketable, and capable of being adulterated, unadulterated paints may be difficult to find; still, there are some brands that are such, and are also cheap and durable, and when they can be procured, it will be quite a saving of expense for the farmer of limited means to purchase them, and do the painting himself.

Procuring a well-known brand that has previously given perfect satisfaction will always be the safer way. In order to do the work of painting well and rapidly, a certain amount of practice will be essential.

The surface to be painted should be clean; hence, when it has become soiled, like some portions of the interior wood-work of the house, for instance, it should first be thoroughly washed and dried. If the surface is rough, it should be smoothed before applying the paint. Sandpaper is frequently used for this purpose. For the outside of buildings, which do not ordinarily require such nice work as the inside, less preparation of this kind will be necessary. The nail-holes and large cracks should, however, all be filled before applying the paint, and the dust brushed off. Where the outside of the building has become weather-worn from long neglect, it will be well to apply one or two coats of cheap oil before painting; since, if the paint were put on without this previous preparation, the oil of the paint would be liable to penetrate the wood, causing it and the lead to separate, and the latter to fall off in scales. The best time for painting is in the spring or fall, when the weather is dry and sunny, and neither very warm nor very cold.

The implements for painting are a good brush, a tin pail to hold the paint, and a good strong ladder to which the pail is attached by a hook. We might also add that a small brush-broom for brushing off dust, etc., will be very convenient where the surface requires it. In painting, the brush should be made to work in the direction in which the grain of the wood runs, covering the entire surface well, and working the paint into the small cracks. Special pains should also be taken to brush over the laps in the wood-work smoothly; carelessness in this respect failing to give the work a uniform and neat appearance. Care should be used not to put on too much paint at a time, but just sufficient to cover the surface well.

Two coats of properly-prepared paint will generally be sufficient where the work is well done; but on buildings long neglected, sometimes a third coat will be necessary.

The choice of color in respect to farm buildings has much to do with their general appearance. This is a matter of taste, since one color of paint would prove as good a protection to the wood as another, where durability is the principal object sought in painting. Formerly, white was the prevailing color for farm-houses, and a country village, except houses entirely "innocent" of paint, presented an unpleasant glare of light in a bright, sunny day. This practice also gave a similarity to the buildings that is not in conformity with good taste. At present there is a desirable change in this respect, and we now frequently see the variety of colors that are more pleasing to the eye, and less offensive to the taste.

In the choice of colors and shades suited to the purpose, there is much latitude, and the opportunity for the display of a cultivated taste and skill in producing a harmony of colors, together with an agreeable and striking contrast. The most pleasing effect is generally produced by painting the body of the house one color, and the cornices, corner-boards, casings, and ornamental work another, considerably darker. The farm-house and other buildings may be painted the same as the house, or other colors may be chosen for the other farm buildings. We prefer the former style; but it is merely a matter of taste. Where different colors are chosen for the out buildings, they should always be such as will harmonize with that of the house.

**The Farm-House.**—The location of the farm-house should never be chosen without due deliberation, as it has much to do with the health and comfort of the household, as well as the pleasantness of the home surroundings. The site chosen for the new house should always be on dry soil. A damp cellar is one of the most objectionable features of a house, and the fruitful cause of various ills. Many incurable diseases, besides deaths that may have been regarded by the members of the family as the dispensation of an overruling providence, might be directly traceable to this source. Unless the site chosen be on a naturally dry soil, it should be made perfectly dry by carefully and thoroughly underdraining. A low, marshy locality should be avoided by all means, the air of such places being filled with dampness and malarial disease.

Hon. Alex. Hyde, Mass., says with reference to this subject:—"A prairie farmer once said to us, 'I would give a thousand dollars for one of your New England gravel knolls on which to build my house'; but here, where dry knolls abound, they are too often neglected in selecting a building site. The excuse for locating farm buildings in low, damp places is a desire to avoid bleak winds; but the pure, dry air, cold though it may be, which plays about the summit of a hill is not half so much to be dreaded as the damp, malarious atmosphere of the more sheltered valley. The fogs which infest the low lands are more chilling and pernicious in their influence than the dry winds of the hill. We have often noticed in riding over our hills and through our valleys on a summer or autumn evening, that while the air on the high lands might be brisk, it was warm and dry compared to that in the valley. As we have descended into the latter, the transition was as marked as on going from an airy chamber into a damp cellar. It is not necessary that the valley should be marshy in order to perceive this difference in the dryness of the air. We have often noticed it in descending from the hills into the valleys of the Connecticut and Housatonic, where the land of the valley was a dry alluvial.

It is a mistake to suppose that the hill is colder than the valley. Every farmer must have noticed that the late frosts of spring and the early frosts of autumn do more damage on the lowlands than the highlands, and the thermometer of a cold, still night shows a lower degree of temperature in the lowlands. The valley may furnish a shelter from the winds, but not from the cold. Cultivate, therefore, the valleys, but place your farm buildings on the hills, where an equally good shelter from the winds can be secured by clusters of white pines or other evergreen trees planted on the windward side of the buildings.

As a second suggestion, we say, locate farm buildings where the sun will shine the most hours of the day and the most days of the year. The value of sunlight, both for man and beast, has never been fully appreciated. There are life, health, and elasticity of spirits in sunshine. Show me a woman that has worked for years in a dark, gloomy cellar-kitchen, and in all probability you'll show me one, the corners of whose mouth are turned down, whose constitution is impaired, and who has lost all buoyancy of feeling. Show me an ox that is stalled in a dark cellar-stable, and yarded on the north side of a barn, and I will show you one whose eye is dull, hide inelastic, hair bristling, and step heavy. Physicians tell us that patients located on the south or sunny side of hospitals are more likely to be cured than those on the north side, and heliopathy is as much in fashion as hydropathy once was. What the exhilarating and invigorating effects of a sun-bath are we can conceive from the change that comes over our feelings and powers when the sun shines out clearly after having been hidden for a long time behind the clouds.

Very nearly allied to the location of the house where the family may enjoy the full benefit of the sun's rays is our next suggestion, that the house be not surrounded by too many shade trees. A tree is 'a thing of beauty and a joy forever,' and we would by no means discard all trees around the farmer's premises; but it is possible to have too much of a good thing. A house without any shade trees looks naked, and *is* naked. A few well-located elms, maples, mountain ashes, and white pines, add much to the beauty and comfort of home, but no one should live in a forest. Mosquitoes may live and thrive in such a dense shade, but man finds his true development where air and light find free access. We never desire to see so many trees around a house that the grass will not make a velvety turf on the lawn. Beautiful as are trees, and exquisite as are the forms and colorings of flowers, there is nothing that pleases the eye more, day after day, than a well-kept lawn. A stately elm here, and a cluster of evergreens there, adorn and protect a rural home far better than a perfect swamp of trees.

We cannot dismiss the trees without alluding to the protection from winds and the healthful influences which evergreens rightly planted furnish in this cold climate. Clusters of balsams and white pines placed between the house and barn, and pig-pen, ward off all noxious effluvia from the latter, and if there is any swamp near the premises, the same trees, with their millions of leaflets, will absorb or turn aside the spores of disease which are constantly exhaling from decaying vegetable matter. Planted on the north of the house and garden, which is generally the windward side, evergreens not only protect from the cold winds, but they fill the air with a most healthful balsam."

The southern slope of a hillside is a desirable site for a house, as it furnishes the opportunity for the enjoyment of the full sunlight during most of the day. The northern side of the road should also be chosen if practicable. The house should also be located near the highway. We have seen houses in the country located in such a manner, and so far from the road, that it would be almost impossible for the inmates to catch a glimpse of what was passing on the highway, and with the exception of going from the premises, or the receiving of visits from friends, they would seem almost as much isolated from the outer world as though they were behind prison bars. The farmer and his sons would not be as much affected by the unpleasant location of the farm-house as the wife and daughters, since their business calls them away into the fields and broad sunlight so large a portion of the time; but it does very materially affect the health and happiness of those compelled to spend the most part of their time in such a location.

The house should be so located and planned that the rooms most occupied in the daily tasks of the home duties should be upon the sunny and most pleasant side of the building, commanding the best view of the highway and neighboring farm-houses. To persons possessing certain temperaments, the isolation and retirement which some localities in the

country impose, is a serious cause of nervousness and morbidness, and it has been stated by some of the highest medical authorities, that much of the insanity among farmers' wives—which is more frequent, in proportion, than among almost any other class of persons—may be directly traceable to excessive hard labor and this isolation and monotony in life. With nothing to divert from the dull and monotonous routine of labor, day after day, and year after year, the mind is apt to prey upon itself with the consequent evil effects.

Our surroundings have much to do in making up the sum of happiness in life, and nothing that contributes to it, even in the least, should be overlooked.

Country life is, of necessity, devoid of much of the variety which the village or city afford, but it need not be rendered doubly isolated and the home a lonely hermitage for that reason. The most pleasant location possible should be chosen for the home, at a convenient and desirable proximity to the public road, on a slight elevation if practicable. In sections where the land is low and nearly level, a slight elevation can be made artificially by carting earth and building up the surface. This involves considerable labor, but will well repay in some locations by the better drainage thus secured, as well as improving the appearance of the grounds.

**Influence of the Dwelling upon Character.**—In the construction of all farm buildings, they should be adapted to the purposes for which they are intended. As the house is designed for the protection, comfort, health, and happiness of the household, it should be constructed in a manner suited to subserve these purposes; hence, it should be convenient, roomy, and of sufficient size to meet the wants of the family. It should be well lighted and ventilated, pleasant and tasty in arrangement and design.

It should be borne in mind that "home" is not merely a place of shelter from the storms and cold of winter, and the heat of summer—a place in which to sleep securely at night, and labor by day; it is all this, and something vastly more. It is a place where the children receive their first and most lasting impressions, those that go far in molding and forming the character of the man and woman in after life. A tasty, orderly home has a refining, educating influence upon its inmates, while an unattractive, gloomy-looking, and poorly-furnished house has an influence which is the reverse from elevating. Where there is nothing to cultivate a refined taste, and there is necessitated a constant association with things that are meager and mean, the mind naturally is warped in the same direction. A pleasant home will not only prove an attraction to the children of the owner, keeping them from places that are debasing in their influences, but will also attract better associates for them, who will come and visit where they find the same refining and pleasant surroundings to which they are accustomed in their own homes.

Things that may seem small in themselves are often vastly large in their influence, and determine the whole course of many a human life. We are apt to speak of "destiny" in life, and regard it as something mysterious and inevitable—an indefinable power that determines the fate of mortals, and over which they have no control. But the fact is, our destiny is in our own hands, and is what we make it; consequently, our own lives, and the lives of those depending upon us, are, in a great measure, what we make them.

We are more or less influenced by our surroundings, and too little attention and importance is generally given to this fact in the construction and furnishing of our houses. But some farmers will say: "Such talk is all very well for those that have plenty of money and can afford to have nice homes, but we are not able to make our homes tasty and attractive; we are poor, and we and our children must *work* for a living. We have neither the means nor time to bestow in beautifying our homes, and the idea of farmers of such limited means, that they can scarcely make a living from their farms, embellishing their homes, is all nonsense!"

To be sure, "bread" is, indeed, the "staff of life," and the material wants must receive

the first attention; it is better, if we cannot have but one, to have the body properly fed and clothed, than to have a beautiful home. But without pleasant surroundings, life is but half a life, and how few realize at what slight expense a home may be made tasty and attractive! How few understand how pleasant and enjoyable life on the farm in the country can be made, and at what small expenditures the rural home may be rendered convenient, tasteful, and really beautiful! For the exercise of good taste and ingenuity does not necessarily imply extravagance. We have seen houses in the city furnished with the most wanton extravagance, where money was lavished almost without limit, and yet they were not beautiful, because there was no taste displayed in the selection and arrangement. To be sure, everything was expensive and rich, but there was a lack of harmony and good taste that offended the eye, as a discordant note in a strain of music offends the ear.

On the other hand, we have entered many a rural country home—a small, bird's-nest kind of cottage, perhaps—where everything seemed so neat, tasteful, and perfectly adapted to the place and surroundings, that it possessed a charm and attraction that rendered the term "beautiful" not an inappropriate one to apply to it; and yet, perhaps, many of the furnishings and ornamentations were rustic carvings, or other work performed by the father or boys of the household, on winter evenings or rainy days, when not employed on the farm, while the wife and daughters had beautified each niche and nook within, with specimens of their decorative art and handiwork, and without, with trailing vines, blooming shrubs, and flowers, in a manner that only a certain quality of feminine taste and ingenuity can devise and execute.

Wealth does not always furnish a tasty, or a happy home, although it may possess the means of doing this, while the lack of a competence need not necessarily prevent the possession of a home that is tasteful and attractive, the abode of contentment and happiness.

**Height of Buildings.**—In the construction of all buildings, adaptation to the purposes designed, as has been previously stated, should be an important consideration. The area of surface covered by a building is not the only standard by which to judge of the capacity. It requires no extensive knowledge of mathematics to perceive—and it may be needless to state—that a building two stories high will contain twice the capacity of one covering the same area that is only one story in height, and that although the two-story building will cost more to erect than that of one story, the former is comparatively cheaper, since twice the capacity is secured, with but a comparatively small proportionate increase in cost. It costs no more to cover or lay the foundation of a high building than a low one, other conditions being equal, while the increase in cost of the extra height is small in proportion to the benefits derived from the increased capacity; therefore, high buildings are proportionately cheaper than low ones. It will be well to bear this in mind in the building of barns for storage, granaries, etc.

In the construction of farm-houses, the height should be proportionate to the surface of ground covered by the building, in order to look well, while the convenience and other benefits derived from having plenty of room should also be taken into consideration. A small, narrow house, built so high that it seems in danger of being blown over by the first strong wind, represents anything but taste in its style of architecture, while a house covering a large area, and so low that it gives the impression to the beholder that the builder was obliged to cut short his work for lack of means or material, is nearly as objectionable, although not quite as much so as the former. A farm-house should, at least, be two stories high. Sleeping-rooms, on the second or third floor even, are much to be preferred to those on the first floor. Such rooms are more healthy, as well as pleasant, since they are more airy and farther removed from the exhalations of the cellar and dampness of the ground. They also afford a finer view of the surrounding scenery.

In some of the newly-settled sections of the country, where building materials are

scarce, small, low farm-houses of a single story are very common, but as the owners become more prosperous and population increases, these give place to the more convenient and roomy structures found in the older-settled portions. Too much room is not desired in a house, but there should be sufficient to meet the wants of the entire household, and a surplus is to be preferred to a lack in this respect, if we were to make a choice of two evils. A house that is a story and a half high is but little better than that of a single story, while it will cost nearly as much as a two-story house. The rooms of a dwelling-house should be sufficiently high to be airy, and admit of good ventilation. Low rooms are unhealthy, and should be avoided.

Extra room in buildings for storage, etc., can often be secured at slight expense, by making the building a little higher than the original purpose requires; as, for instance, the wagon-house, tool-house, or wood-house, may be made, by this means, to furnish room overhead for the storage of small crops, or the spreading of those that require drying.

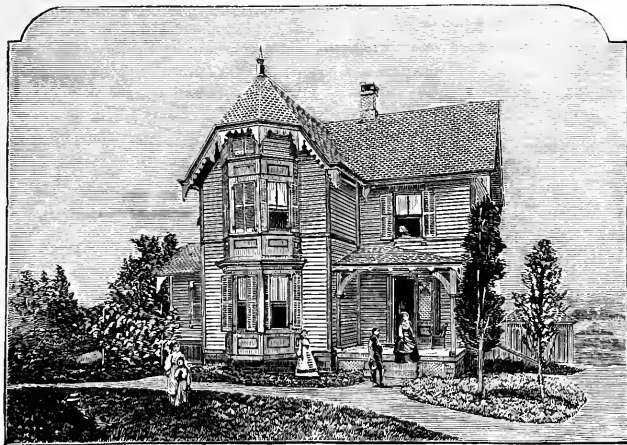
**Plans for Farm-Houses.**—Before erecting a new house, it will be very essential for the farmer not only to have a well-defined plan, which will secure for himself and family all the conveniences and comforts practicable, but also to carefully estimate the expense that will be incurred, and whether he can safely and without injury to his financial prosperity withdraw from his business the amount of money necessary for the purpose. In some cases it may be found better to occupy the old house two or three years longer, until the financial status of the farmer is such that he can safely invest in the enterprise of building the new; for while a neat and attractive house to live in is a very desirable thing, still it is better to occupy one that may be old and time-worn, and even shabby in appearance, than to be driven into bankruptcy by the erection of a new one before being really able to do so. On the other side of the question, farmers, as a general rule, are very cautious and quite too apt to go to the opposite extreme of delaying the enjoyment of the new beyond their means, instead of taking them in advance. And too many of them subject themselves and families to the deprivation of many things that might and should be enjoyed.

Life is short at the longest, and if a few years of it may be made brighter for the household by occupying a neat and commodious house, why not brighten these few years for such members as soon as may be, instead of delaying it and involving a loss to all, and, perhaps, until it shall be too late for some loved one ever to enjoy it?

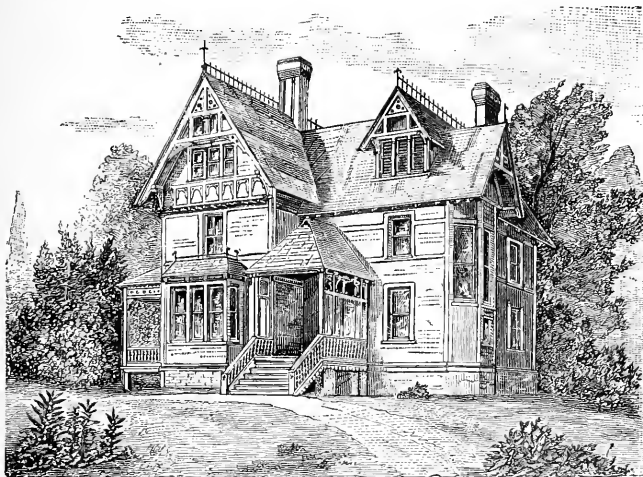
A house, in order to be comfortable and pleasant, need not necessarily be very expensive. A neat and tasty cottage, relieved by slight ornamentation of the severe plainness so frequently characterizing country homes, would be very suitable for the purpose. The few plans which are here presented will be found to come within the range of most farm-houses, both as to size and expense, and also valuable, as suggesting improvements in design in the general style of architecture, as well as convenience of arrangement, and will prove of practical value to those contemplating building or remodeling. For the first four designs represented in this department we are indebted to W. T. Comstock, publisher and successor to Bicknell & Comstock, of New York city, being copied by permission from the specimen-book of *One Hundred Architectural Designs*.

The first—a design for a country house—represents a large handsome building of sixteen rooms of superior accommodations. It was remodeled two or three years after being built, to its present style. The materials are of wood, the frame sheathed and felted, the roof slated, and the interior finished in a tasteful and appropriate manner. At the time of being remodeled, a gas-house was built, with fixtures for lighting the house. This design represents the most expensive dwelling which we insert—the estimated cost of erecting being about \$10,000. The archway over the carriage drive-way adds very much to the appearance of the house, besides being a great convenience. The lower floor contains a parlor, dining-room, library, hall, sitting-room, two pantries, laundry, kitchen, and a dinner-service room. As a country-seat for a city gentleman, or a house for the farmer of ample means, such a building is admirably adapted.

THE Veysey Homestead Cottage was recently erected in the village of Tenafly, N. J., at a cost of about \$2,000. This sum includes a large school-room which communicates with the



THE VEYSEY HOMESTEAD COTTAGE.



A PICTURESQUE COUNTRY VILLA.

dining-room, and four finished attic rooms. It is a very commodious, tasty house and one that would be an ornament to any country town or village. The owner of this house used the very best material of their several kinds. By using material less expensive such a cottage could, of course, be built at considerably less expense. The above is an illustration of a

somewhat more elaborate and expensive house, which contains a conservatory in front of the first landing of the stairway in the octagon end at the right, and a dressing room below. The library is in the rear of the main hall, and at the right of the back hall, which includes the back stairway. The parlor occupies the front of the house at the left of the hall, with the dining-room, pantry, store-room, china-closet, and dumb waiter in the rear. The plan is designed for a kitchen in the basement, although it can be included on the principal floor, if desired. The second floor contains three bed-rooms, a bath-room, and five closets. Three rooms may also be included in the attic. The estimated cost of such a building will vary according to the price of material at the time of building, but may be estimated at from about \$3,000 to \$3,500.

The following represents a small cottage suited to a family of two or three persons. Such a building could be erected at a cost of from \$800 to \$1,000, according to the locality and style of finish.



AN ORNAMENTAL COTTAGE.

The ground and chamber floor plan of the English cottage that follows, as well as those of the rural cottage on page 627, will be readily understood by a careful examination; hence they require no extended explanation.

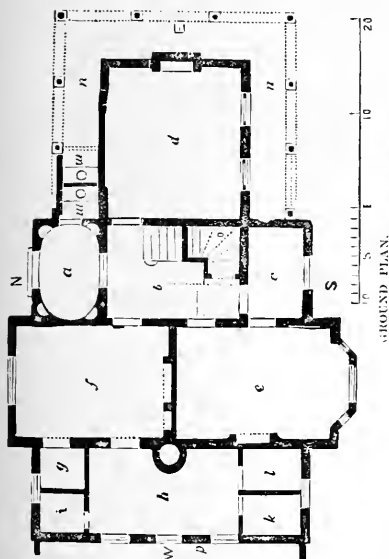
Although designs are a great assistance in suggesting a plan for a house, still if a person contemplating building could examine several houses which seem to be well-suited to his purpose, he could obtain more real information and satisfactory knowledge respecting a plan than from any diagram on paper that could be given. Combining the best things contained in several designs will often prove very satisfactory. It will be noticed that in some of the plans given, provision for a dairy-farm has been made by including a milk or cheese room.

In those sections where there are no creameries or cheese factories at which to dispose of the milk, a milk-house, located a short distance in the rear of the dwelling-house, could be erected for that purpose, or a suitable room in the house appropriated to that use; but

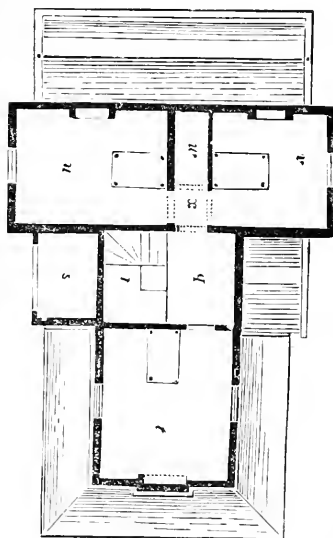
the former is the better method. Every plan that might be proposed would of course be subject to modifications, according to the location and wants of the family.



ENGLISH COTTAGE



GROUND PLAN.



CHAMBER FLOOR PLAN.

As a general rule, however, there are certain things that will apply equally well to all farm-houses—large or small. They should be in structure, types of stability, and completeness, adapted to their surroundings, not excessively ornamental, but sufficiently so to be

tasteful and attractive, and to avoid that severity of plainness that characterizes country houses generally.

Every farm-house should have a bright, sunny and pleasant kitchen. We mention this room first, because it is where the majority of farmers' wives spend much of their life in performing the daily tasks for their household. Therefore this room should be located in the most pleasant and cheerful part of the house. Next in importance should be the sitting-room, where the family spend their evenings, and the wife and daughters perform the sewing for the family in the afternoons,\*when the general housework for the day is done, and where, in the long, winter evenings, the hours should be diversified with reading aloud by some member of the family, or enlivened by music, while old garments are being rejuvenated, or new ones made by skillful hands. This room can also be used as a library if necessary, for all farmers should have something of a library—the more books the better, if of the right kind.

In many country houses the kitchen is large, and serves the purpose of both cook and dining-room. A better arrangement than this would be, to have the kitchen made just large enough to serve the purpose of cook-room and general house-work, with a good-sized dining-room leading from it.

Opening into the sitting-room there should be a good-sized bedroom, which may serve, when occasion requires, for a "sick-room." This room should be well lighted, and located on a sunny side of the house; it should contain an open fire-place or grate for heating in cold weather, and also for purposes of better ventilation. A parlor is a great convenience, since it is not always desirable to introduce callers into the sitting-room. But we do not approve of a parlor, as such, or as is generally found in most dwellings, which is a room set apart for the "best things"—things regarded too choice and sacred for the common use of the family—the best carpet, furniture, pictures, books, &c. and into which the family rarely enter, except to entertain visitors. Nothing should be too good or choice for the enjoyment of the family circle every day, and nothing should be used by the family too ignoble and poor to be seen by visitors. The parlor should be a place to be freely enjoyed, when desired, by the entire household, a kind of second family room, to be appropriated as convenience requires.

In every farm-house there should always be one room set apart for the children, to be used as a play-room by them at will. It should be large and airy, and located on a sunny side of the house. The pantry should be of good size, and conveniently arranged adjacent to the kitchen, in order to avoid unnecessary steps in doing the work.

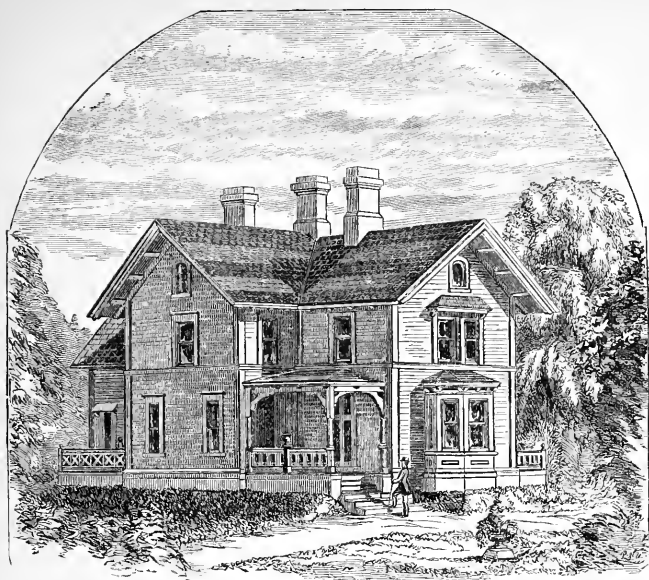
The cellar-door and door leading to the wood-house should also open into the kitchen. A wash-room or laundry, and a room for the storage of groceries, should also be on this floor, unless such arrangements are made in the basement.

If cheese and butter are made on the farm, separate rooms will be required for the milk and the storage of cheese, either in the dwelling-house or in a small dairy-house suited to the purpose. The dining-room should contain a china-closet. Another closet in this room for the storage of other things would also be a great convenience.

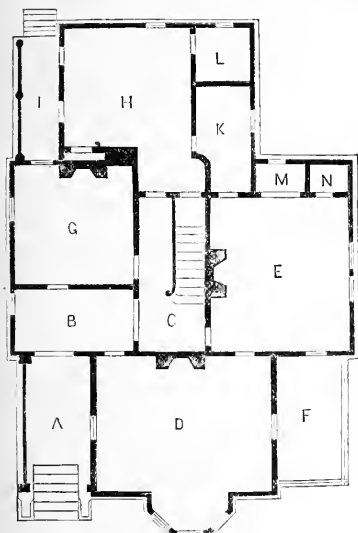
Every bedroom and chamber should also contain a good-sized closet. Closets are of great utility in a dwelling, and there can scarcely be too many of them.

In planning such conveniences for a house, a woman's judgment and ingenuity will generally be more suggestive and reliable than a man's, as her business pertains more to such matters; hence the farmer should always consult his wife and daughter in this respect.

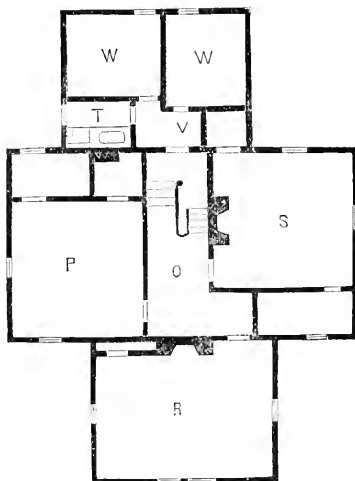
Perhaps the reader may have heard of the wealthy gentleman who established and liberally endowed a now popular institution for the education of young ladies, and that in the large and costly edifice erected for the purpose, and planned by the donor, the young ladies who became pupils found, to their utter consternation, not a single closet from attic to basement!



RURAL COTTAGE.



GROUND PLAN.



CHAMBER-FLOOR PLAN.

On being consulted on the subject, the liberal donor replied that the young ladies would find two hooks on the back of the door of each room, one for the "every-day dress," and the other for the "best dress," and that he did not consider a closet necessary! Had a woman's advice been consulted and followed in this respect, it is quite certain that the above plan, which seemed so admirable to the designer, would have been considerably modified. The sleeping-rooms of a dwelling should be large and airy, with ample means provided for good ventilation—the latter is very essential.

In constructing a house the aim should be to render it healthful, comfortable, and convenient. These are the first essentials; but since so much time is to be spent in it by the family, it should also be in good taste, with pleasant surroundings. We have seen dwellings so unskillfully planned, that it would require three or four times the number of steps in doing the work that another would, which was designed with a view to convenience. Farmers' wives, as a general rule, are over-worked, and suffer in health and spirits from the excessive labor they perform; hence they show age earlier and break down sooner than almost any other class. But to take unnecessary steps and perform labor that might just as well have been avoided is a great waste of time and strength—a loss that brings no recompense in return. Life and health are too sacred and precious to be thus wasted, and too much pains cannot be taken to secure convenience and labor-saving in planning a house.

**Warmth of Dwellings.**—In those sections of the country where the climate is uniformly warm, a protection against cold in the erection of buildings would not seem important, but it becomes a very essential consideration in this connection in the Northern States, where, during nearly half of the year, the temperature is low, and strong winds force the wintry air into every crack and crevice, thus causing the cold to seem doubly intense.

A cold house is not only exceedingly uncomfortable to live in, but is also equally unhealthy, and we believe many of the numerous cases of consumption to be found in the country towns of the Northern States might be traceable to this source. Unless the utmost care is taken in building a home to render it perfectly tight and secure, it cannot be made comfortable for the inmates in severe weather by any method of heating. We have been in houses where in extremely cold weather the temperature of the rooms would be much too warm, while it would be impossible to keep the feet comfortably warm, on account of the cold current of air that was constantly finding entrance through the cracks of the floor or about the casing. Ventilation is a good thing for a dwelling, but health and comfort require certain prescribed methods and rules for accomplishing it, and we venture to say that a country house was never yet built so tight and warm as to render it unhealthy on this account, although they are generally unhealthy through lack of suitable ventilation. In building, the greatest care should be used to render the walls impenetrable to the cold winds.

Brick or stone houses are generally warmer than wood, as the walls are uniformly tighter, but wood houses are pleasanter, and can be rendered warm by being suitably constructed. A sufficient amount of the proper kind of material should be used for the covering, and it should be well put on. Brick is commonly recommended for filling the spaces between the inner and outer walls, except the places required for the posts, studs, and braces. These serve the double purpose of warmth and that of excluding the entrance of rats and mice between the walls. Old bricks are as good as new for this use. The more recent practice in architecture of adding an inner lining of felt or heavy paper in covering the walls, aids very materially in securing warmth.

All the work about the building should be well done. The walls should be nicely plastered, and the casings and all the wood-work well fitted. The lumber employed for the inside finishing should all of it be well seasoned, and kiln-dried before being used. Unless this precaution is taken, the wood-work will be liable to shrink and crack, making it look very badly. Very nice houses are frequently greatly marred from this cause. One of the

luxuries found in the majority of city dwellings, and but rarely in the country, is the facility for warming the building throughout. A good furnace for this purpose costs less than steam apparatus, besides, we think it more desirable, if at the same cost, and although attended with some expense in procuring and supplying with a sufficient amount of coal for the purpose, we believe many farmers would find that the comfort thus afforded the household would amply repay for the additional outlay.

**Windows.**—The importance of an abundance of sunlight in a house can scarcely be over-estimated. Light is a promoter of health, comfort, and cheerfulness. Plants will not attain a healthy growth in a darkened room, neither will individuals that are deprived of the sunlight be strong and healthy. It is a well-known fact, as has been previously stated, and the testimony of prominent physicians that invalids occupying the sunny side of a hospital are more liable to recover than those occupying the side where the sunlight scarcely ever enters. Everyone feels more or less the depressing influence of a succession of cloudy days, an influence that is only dispelled when the bright sunlight again floods the earth with beauty. There is too much indifference or carelessness with respect to admitting the sunlight into our dwellings, or rather it is the common custom to carefully exclude the sunlight; and for fear of its fading the “best” carpets or the upholstering of the furniture, shades are carefully pulled down, blinds tightly closed, until scarcely a ray of light is permitted to enter. The result is that such rooms become damp, musty, and unhealthy, and were a perfectly healthy person compelled to be confined within them for a sufficient length of time they would deteriorate both in health and spirits. For some diseases, sun-baths have been found to be one of the most successful remedies.

Every dwelling, as well as building for sheltering animals, should be constructed with a view to admitting the sunlight, and those parts of the house most occupied by the family should be located on the sunniest side of the house. Ample provision should be made for windows, both in number and size, in planning a house. When glass was first introduced into use for windows, it was very expensive, consequently small windows were a necessity; but at the present period glass has become one of the cheapest of building materials.

Very small windows do not look well in any house, whether large or small, while windows that are too large for the size of the building look almost as badly. We think windows should be made as large as may be without being disproportionate to the size of the house, and as many of them be used as the dimensions of the house will admit, and at the same time keep within the limits of good taste. If it is found that a number of large-sized windows in a house furnish the opportunity for the cold to enter about the casings during wintry weather, this evil can be easily remedied by the use of double windows on the north and west sides of the building, or throughout during the cold weather. This might be done at a comparatively small expense, and a home once supplied, is permanently furnished in this respect. Such windows could be taken out in summer and be easily replaced for winter use; by this means, other conditions being favorable, a house can be made very warm and comfortable.

Small-sized panes look cheap, and are not in good taste; they are now seldom seen, except in very old buildings. Very large panes are more expensive than those of medium size, and if broken are not as easily replaced. For a farm-house, medium-sized panes seem most appropriate. A good quality of glass should be procured, and the sashes should be made of suitable material, well put together, and painted on both sides. The windows should be made to lower at the top, as well as raise at the bottom, for the purposes of ventilation, and rendering the rooms cooler in summer. They can also be washed easier. The best arrangement for this purpose is a cord, weight, and pulley, by which means the window may be lowered at the top or raised at the bottom at any distance, and held in place without any kind of fastening.

Each window should be supplied with a good patent spring fastener to keep out intruders. The best for this purpose are those that are furnished with a little spring, which holds the catch and prevents its being pushed back from the outside by any means, such as running a knife-blade or thin piece of steel or iron between the upper and lower sash. Bay-windows, properly located, add much to the exterior and interior appearance of a dwelling, and are just as much in conformity with good taste on a farm-house, as that of a village or city dwelling.

**Doors.**—The arrangement of the doors of a dwelling should be such as to secure comfort and convenience, and save unnecessary steps in the household work. Their location should be so planned as to give ready access to all parts of the house, and at the same time not interfere with each other. They should also be of sufficient size. Narrow doors are a great inconvenience, and should never be used in any building. In moving large articles, such as furniture, from one room to another, a narrow door involves the risk of injury to both the wood-work of the house as well as the furniture, as the battered condition of many doorways fully prove. In farm-houses generally the doors are much too few in number and too narrow.

Double sliding doors for certain rooms are a great convenience, since they admit of throwing two apartments into one when desired, furnishing a large, cool, airy room in hot weather, or ample accommodations for a large gathering of friends on social occasions. A sitting-room and parlor, or dining-room and sitting-room, can thus be easily converted into one large apartment, rendering the interior of the house more pleasant, convenient, and comfortable at certain seasons.

The most common and convenient door-fastenings are those of the combined catch and lock style, with a knob on each side of the door. For perfect security, the outside doors should be provided with a peculiar spring-lock which cannot be easily tampered with. The common lock can easily be fitted with an ordinary key, or the bolt readily forced back by other means, hence, it is not a very good protection. Strong inside bolts for the entrance-doors of a house are also a good security against intruders.

**Floors.**—The supports for the floors of a house should be strong and durable, and the floors of good material, well seasoned and carefully put down. It would not probably be of frequent occurrence that the strength of a floor of a farm-house would be fully tested, but there are occasions, such as social gatherings, etc., when a large company might be collected in a single apartment, and we have personal knowledge of serious accidents being occasioned by the floor giving way in old or improperly-constructed buildings, at such times. A great strain might be brought upon a floor in this way, and it is well to provide beforehand for any such contingency, by having the floors well supported in constructing a house, or, if the house is already erected, extra supports can easily and at slight expense be placed under the floor, and thus additional strength imparted.

In laying the floor, if the timber is not well seasoned, it will shrink, leaving large cracks between the boards, which will furnish a safe harbor for moths and bugs under the carpet; or, if uncarpeted, a place for the dust to collect, besides giving a room an unsightly appearance. In rooms that are not carpeted, a floor of alternate strips of light and dark wood looks very nicely. The boards should all be of uniform width, not exceeding four inches, although for a small room three inches is to be preferred. Black walnut and ash are the best materials, but chestnut or yellow pine is sometimes used instead of ash for this purpose. Such floors should be thoroughly oiled before being used. Finishing the interior of such rooms with the same kinds of wood is also in very good taste; for instance, having the doors of black walnut, and the wood-work about them of ash and black walnut, the lighter wood coming between the door and the outer casing, etc., and the light and dark alternating in the other

portions of the wood-work. As black walnut is somewhat expensive, other wood stained to imitate that color might be used for the doors and casings at much less expense, and would answer the purpose very well; but for the floor, the walnut should be used.

**Stairs.** — The steep, narrow stairways that are so commonly seen in old country houses the not only a great inconvenience, but positively dangerous, especially for children, while they are also a very difficult means of transit from one floor to another, for the older members of the household.

The stairs of a building should always be located where they will be convenient of access, since in doing the work of the household it is necessary that they should be frequently used. They should be made broad, of slow elevation, and easy of ascent in every respect. They should also be furnished with a good stout railing on the side opposite the wall. Whatever means may be used in economizing room in a house, it should never be employed in respect to the stairs. Such a course will always be found to be very poor economy in the end. To be obliged to carry furniture or anything heavy or cumbersome up or down a steep, narrow stairway, or to be obliged to go up or down such stairs many times a day, is no easy task. It is not a matter of surprise that so many farmers' wives grow old so early, or become broken down in health, when we consider the vast amount of hard labor they perform, together with the extra labor to which they are so often obliged to submit, through the inconvenient arrangement of the homes they occupy. Straight, broad stairs of slow elevation are the most desirable, but winding stairs economize room, and are to be preferred to the steep, narrow ones so commonly seen in farm-houses.

**Roofs.** — The style of the roof will depend mainly upon the general architectural plan of the building, although some styles of architecture are not as arbitrary in this respect as others, and the taste of the owner can be brought into exercise as to choice between a steep or moderately sloping roof. A flat roof is objectionable, especially in those latitudes where a large amount of snow falls. On such roofs the snow is liable to accumulate, and requires a considerable amount of care and labor in removing during the winter. Various materials are used for covering roofs, wood, slate, and tin being the most common. The preparations in which tar is used are considered objectionable, since they are more liable to take fire, and communicate it more rapidly than others.

Slate and tin are durable and the best preservatives against fire, although there are certain preparations and paints that are very good in this respect, which are used to some extent for covering shingles. The best paints for this purpose are such as will be fire-proof and at the same time preserve the shingles. Shingles have been in use for roof coverings for a long time, and are still extensively employed, although in some sections slate and tin have taken their place in a great measure. The principal kinds of wood used in the manufacture of shingles are cedar, spruce, and pine. Many others are, however, employed to a certain extent. In order to make a durable roof of shingles, they should be perfectly dry when put on. If those containing the least amount of sap are used, the roof will soon be liable to leak, since they will warp and shrink in the hot sun, thus furnishing abundant opportunity for the rain to find an entrance.

Tin roofs are durable, but require considerable care in making, in order to obviate leakage. They should always be kept well painted to prevent rusting. Slate, when well laid, makes a very durable roof. Such a roof must first be covered with boards so tight as to prevent the entrance of rain and snow in a strong wind; besides, the rafters must be so very strong that any amount of snow that may accumulate on the roof shall not by its weight cause it to settle in the least. If it does settle, the slates, being very brittle, will break and come off. Steep roofs, on which the snow cannot lodge, are to be preferred where slate is used.

**Chimneys.**—The hearth-stone, around which our forefathers gathered, is now only known in poetry and song; and the mammoth chimney up which the bright flames leaped and roared, while the hours were beguiled with pleasant household chats or neighborly sociability, interspersed with such refreshments as corn popped in the ashes, rosy-cheeked apples, and sweet cider, is among the obsolete things.

Instead of the old-fashioned fire-place, we now have the steam radiator, the furnace-register, the air-tight stove, and kitchen-range, while the only suggestion that is furnished us of the cheeriness of that old time-honored institution is the open grate, at present too rarely seen, and typical of the past. Instead of one large chimney for the house, as was formerly the custom, we now have smaller ones and more of them in number. These should always be conveniently located, of small size, and well built. By such arrangement, a better draught is secured, much less stove-pipe is required, and the general appearance of the house improved, while there is also much less danger from fire, owing to less pipe being required. In building, the utmost care should be taken to have the chimneys properly constructed, and the foundations substantial. Defective flues are the frequent cause of destructive fires, and only the most skilled workmen should be employed on this part of the building. The danger from falling sparks is diminished, and a better draught secured, by having the chimneys built to a good height above the roof.

**Mantels.**—Mantels add much to the appearance and convenience of the interior arrangement of a house. They impart a more cozy and better finished look to a room, while they are very useful for arranging the ornamental, as well as some of the more useful things pertaining to the house. Marble is, of course, the nicest material for this purpose, but it is quite expensive in some sections. Very pretty mantels may be made of wood, and, when tasteful in design and neatly finished, look quite as suitable for a farm-house as those of more expensive material.

**Closets.**—In building a house, we would recommend by all means that there be plenty of closet-room. Closets and cupboards can scarcely be too numerous, and only those housekeepers who have been limited in such conveniences can realize the great inconvenience caused by a lack in this respect. Places of storage for small things, such as closets, cupboards, and drawers, will always be found useful, and save many needless steps daily, in the performance of the house-work, that would otherwise have to be taken. In planning a house, there should be a closet or clothes-press in every chamber, and at least one on the lower floor for general use in hanging coats, hats, etc. Besides these, there should be a china-closet in the dining-room, with drawers underneath the shelves for the table-linen, and another closet for the storage of various things for table use. If, in completing the plan for a house, any little nooks or space can be found, aside from the closets already planned, finish them into a closet or cupboard; they will never come amiss, but will all be utilized.

**Piazzas.**—Porches and piazzas add much to the attractive appearance of dwellings externally, and render them more pleasant to live in. A good piazza will make the rooms of a house that adjoin it more cool in summer by its shade, while it will be a comfortable and pleasant place in which to spend leisure hours, such as the noon time and evenings, in warm and pleasant weather. There is an objection to their being so built as to exclude the sunlight from the house too much; still, a narrow piazza is not as convenient, neither does it look as well as a wide one. To avoid this difficulty, an awning is frequently used instead of a roof for covering or extending a piazza located on the south side of a building. By this means shade may be had when needed, and, by its removal, the sunlight admitted at other times. A veranda located on the north side of the house furnishes a most cool and comfortable place in hot weather, while the objection that might be raised respecting a southern location, of excluding the sunlight in cooler weather, would be obviated.

**Eave Troughs.**—No house is complete without being supplied with eave-troughs for conducting the water from the roof. By their use, rain-water may be secured, if desired, for various purposes, such as for cisterns, or watering-troughs. In sections where the well water is hard, this is a very easy means of securing soft water for washing and other household purposes. Where barn-roofs are sufficiently large, cisterns may in this manner often be kept well supplied with water for watering stock.

Wherever eave-troughs are used, the water should either be conducted into cisterns, or some other place away from the house, to permit its reaching the cellar. Without them, the constant dripping from the eaves in a rain-storm washes the soil and spoils the turf close to the building, while the water is very apt to find its way into the cellar, making it very damp and unhealthy. It is rare to find a dry cellar where they are not employed. It is also very unpleasant to go in and out of a house when it rains, and have the surplus water caught by the roof come flooding down upon one, as it will from buildings that are not supplied with them.

**Blinds.**—These add much to the pleasant appearance of a house, both externally and internally. While they are not absolutely a necessity, still a dwelling seems bare and unfinished without them. They make the house much cooler in summer, warmer in winter; are a protection to the windows, admit of regulating the intensity of light in a room better than could be accomplished by any other means, and also aid in keeping out flies and other insects in summer.

A house seems much better furnished and more home-like with them, and they add a kind of completeness and finish to a building that is not secured in any other way. The best blinds are the cheapest in the end, and should always be procured. They should be well fitted and hung, and provided with strong and suitable fastenings to make them secure, whether open or shut.

**Lightning-Rods.**—A good lightning-rod, well put up, is a great protection to a building against lightning, while a poor one, or a good one that is improperly put up, is a source of danger. In procuring a rod, only the very best should be selected, and a person who thoroughly understands the business be employed to put it up.

The size of the rod should be nearly uniform throughout, and not less than three-fourths of an inch in diameter. A larger size is to be preferred to a smaller. The number of points, and the height to which they should rise, will depend upon the size of the building. In case of a small house, a single point may be sufficient, providing it be raised sufficiently high above the roof. The usual rule to be observed in such cases is, that the point should at least be elevated half the distance to which its protection is intended to extend, or, in other words, the protection secured will be extended over the area of a circle of which twice the elevation of the point is one-half the diameter. Thus, if the ridge of the roof be forty feet in length, the point should have an elevation of ten feet, which is one-half the radius of the circle of protection; if the ridge be fifty feet in length, the elevation of the point should be twelve and a half feet, and so on. Where there are several points on the same building, it would be safer to have them a little nearer each other than this distance, and they must always have a perfect connection with each other. The more direct the course of the rod is to the earth, the better, and acute angles by bending it in its course to the ground should be avoided.

The lower end of the rod should be placed sufficiently deep in the earth to always be in contact with moist soil. This is very essential, and if it could terminate in an underground spring of water, or beneath the surface of the water of an old well located at a sufficient distance from the house, so much the better. But it should never terminate in a cistern. This would be a serious mistake, because the water contained in it is insulated from the earth by the lining of cement. When the building is covered with a metallic roof, it should be con-

nected with the lightning-rod, or the lightning might take the course of the pipes which convey the water of the eave-troughs to the ground, instead of the rod. Worthless rods have been extensively sold by unprincipled agents in different parts of the country, and hence a prejudice has been created in many instances against the use of lightning-rods; but a counterfeit article does not necessarily prove the genuine to be of no value. Many worthless rods have also been devised, and patented by persons entirely ignorant of the principles of electricity.

Prof. Joseph Henry, of the Smithsonian Institute, recommends that the rod be round, or rather cylindrical, because electricity repels itself, and tends to escape into neighboring bodies from points or sharp edges; hence, flat or twisted rods are for this reason imperfect conductors, as they tend to give off lateral sparks from the sharp edges during the passage of the discharge, which might in some cases set fire to very combustible materials.

**Safest Position During a Thunder-Storm.**—With respect to the safest position during a thunder-storm, especially in a house not well protected by a lightning-rod, the best locality is generally conceded to be in the middle of the room, and a horizontal, rather than a vertical position.

Windows, whether open or shut, should be avoided, also chimneys, but in a house not properly protected by rods, no place can be considered as entirely safe. Trees in the open air should also be avoided, as, the trunk of a tree being a bad conductor of the electrical fluid, the discharge will leave it and pass through the body of a man or animal that might be near it.

**Ventilation.**—The necessity of an abundant supply of pure air in maintaining a healthy physical condition, is too little understood, or, if understood, too commonly disregarded by the great majority of people.

Even the most highly educated classes, who are perfectly familiar with the laws which regulate sanitary conditions, are frequently careless and indifferent with respect to ventilation. Hence, we have dwellings, churches, public halls, school buildings, factories, steam-boats, cars, etc., so constructed that it is impossible to furnish an adequate supply of pure air for those occupying them, and they consequently become places where the blood is poisoned by the inhalation of vitiated air, and various forms of disease are thereby engendered. We believe the majority of diseases to which human life is subject (and we might also add that of many of the domestic animals) are due to improper ventilation. This seems strange, when pure air is so free and abundant, and we have but to permit this gift of heaven to reach us with its life and health-giving influences. But it is nevertheless a fact that instead of admitting this necessary element, we shut it out of our houses, exclude it from our presence, and breathe in its place poisonous gases freighted with the elements of disease and death.

The majority of persons would refuse to eat food or drink water that they knew to be unclean, or to wear clothing that was soiled and untidy, and yet they will breathe over and over again air that has been rendered impure, either by its having been exhaled from their own or other persons' lungs, without the least thought of its uncleanness, or the evils that may result.

Consumption, typhoid fever, scarlet fever, diphtheria, and many other diseases are frequently caused by breathing impure air. When there is such gross carelessness and indifference with respect to these sanitary conditions, it is no wonder that such diseases are so prevalent, and their victims so numerous.

It is stated by no less an authority than Dr. Leeds, that it is as easy to prevent consumption by the use of pure air, as it is to prevent drunkenness by the use of water. We have known of many cases of incipient consumption, or consumption in its first stages, as well as fevers and other diseases, having been cured by the patients being constantly supplied with

an abundance of pure air. It is often astonishing to see how rapidly a person will recover as soon as his strength will admit of his getting out to spend a considerable time in the open air. It has been found by experiment that an adult man gives off, in breathing, from six to seven-tenths of a cubic foot of carbonic acid in an hour while awake, and from five to six-tenths of a cubic foot when asleep. Also that he inhales at least twenty cubic inches of air at each breath, which, allowing twenty respirations per minute, is equal to fourteen cubic feet of air passing through the lungs per hour.

The air that is expelled from the lungs in breathing contains from 4 to 5 per cent. or more of carbonic acid, and is saturated with moisture from the lungs. Besides the vapor given off by the lungs, there is also that which escapes through the pores of the skin, which is estimated to be in an adult person equal to from  $\frac{1}{12}$  to  $\frac{1}{6}$  of a pound per hour, which also escapes into the surrounding air. These vapors, thus escaping from the body through breathing and perspiration, contain substances which are injurious, if taken into the system again, and which are necessary to be removed at first, in order to maintain a healthy condition. One of the functions or uses of breathing and perspiration is to remove them from the body. We can, therefore, easily perceive how soon the air of a small and perfectly tight room would become vitiated by even the presence of one individual, and also how important it is that the effete waste matter once thrown off from the system, should not be taken into it again. This can only be prevented by proper ventilation, which shall provide a sufficient supply of pure air to be inhaled, instead of that which has been thus poisoned.

In the construction of a house, one of the most important things to be considered is providing suitable means for its proper ventilation. To permit of a suitable amount of fresh air being introduced into a room, and thoroughly distributed without producing draughts upon the occupants, should be the object in planning for this purpose. Volumes might be written on the different methods that might be employed in ventilating buildings and the arguments given to maintain them, but our space will admit of only a few general suggestions with respect to the subject.

No change of air can be obtained in an apartment except when the inside air is either warmer or colder than the air outside, or in other words, except there is a difference of temperature between the indoor and outdoor air. For this reason open windows will not prove an effectual means of ventilation unless the air in the room is warmer or colder than the atmosphere without. The old-fashioned fire-place furnished to our ancestors an admirable means of ventilation, since it permitted the impure air to pass up the chimney, while pure air could be admitted by windows or doors, or what would be better, through a tube or pipe suitably arranged for the purpose of conveying it into the apartment. For this reason open grates and stoves similarly constructed furnish better facilities for ventilating a room than close, air-tight stoves. A considerable portion of warm air will, of course, also by this means escape up the chimney, but the benefits to be secured by the improved condition of air in the room will more than repay the extra expense of heating.

The windows of a house should all be so arranged that they can be lowered at the top, as well as raised at the bottom. Doors and windows should be freely opened in a house during the summer, in order to permit the pure air from without to have free circulation through the building. This cannot be well secured unless the windows or doors on opposite sides of the room be opened, thus furnishing the means for the impure air to escape and the pure air to enter. If no means are provided for the escape of the air already in the apartment the outside air cannot be admitted, for nothing can ever be *more* than full, and we cannot force air into a room already full. Windows should also be opened every few hours during the winter, if no other means of ventilation are provided.

The fire in every ordinary stove furnishes the means for the escape of some of the air of the room by the draught produced, while fresh air from without finds entrance from about

the windows and doors; but this is far from being sufficient for ventilating purposes. Chimney-flues or other means of ventilating should be employed. Chimney-flues, in order to be effectual as ventilators, must have the air within them warmer than that in the apartment, otherwise they cease to act. In arranging for ventilation, whatever the system practiced, two things are essential, viz., the providing of suitable inlets for the admission of fresh air, and equally capacious outlets for the escape of the impure air.

The opening for the introduction of fresh air for ventilating purposes may be either above or below the place of outlet for the foul air. It is a good plan to build a ventilating-flue close to the chimney, by which means the air within the flue will be warmed, causing a good draught. It is important that the air admitted for ventilation should always be pure. The custom that is frequently followed, of supplying the air to a furnace or other heater directly from the cellar of a house is very dangerous, since the bad air of the cellar is thus diffused throughout the house. Even cemented cellars are not an exception to this rule. The air for such purposes should be obtained from outside, and always be pure and fresh.

As a general practice, people suffer more from bad ventilation in their sleeping-rooms than elsewhere. Too much fear is entertained from breathing what is called "night air," hence, windows are closed, or only slight openings made for ventilating purposes, and the air of the room breathed over and over again, and the blood poisoned by the process. During the day there is no air for us to breathe but day air, and there is just as certainly no other air for us to breathe during the night but "night air," consequently there is no other alternative for us but either to cease breathing at all during the night or breathe "night air." We must therefore take that which is already in the house, and to a greater or less degree impure, or that which is pure from without; and how much better to have the pure air from without.

The air of a sleeping-room should be just as pure in the morning, after the room has been occupied all night, as the outdoor air, and yet how few sleeping-apartments could be found under such sanitary conditions. Some writer has called sleeping-apartments, as generally managed, "charnel-houses," suitable only to die in, which, unfortunately, is quite true in a majority of cases.

The farmer and his sons, being out in the field during the day, suffer less from poor ventilation than the wife and daughters, who are confined more within doors. If farmers generally, either in constructing new dwellings or repairing old ones, would pay more attention to securing the means of proper ventilation, and the best use of such facilities were employed by their families, there would be less need of doctors and their potions, and the figures of the mortuary records of the country would be greatly reduced.

**Cellars.**—A dry, well-ventilated cellar is essential to the best sanitary condition of a dwelling. In selecting a site for a farm-house, therefore, dry land on a slight elevation, which will admit of suitable drainage, should be chosen, if practicable. But there are many sections where the land is wet, and unless some means are employed for under-draining it, the cellars will either contain standing water a large portion of the time, or be dripping with moisture. Such cellars are very unhealthy, and should never be permitted to remain in such a condition while the buildings above them are used as habitations. They are also not fit for the storage of family supplies.

Even dry soils are damp after heavy rain-storms, consequently some means of drainage should be provided in every cellar. But where the land is naturally wet or retentive of moisture, a thorough under-draining is highly essential. This may be accomplished by laying drain-tile a foot or more below the bottom of the cellar, both inside and outside the cellar-walls, which shall go around the cellar, thus securing a drainage on every side. These tiles should communicate with a receiving drain, which shall take the water quite a distance from the premises. The bottom of the cellar should then be covered with stones or brick (stones

to be preferred when they can be obtained), and well cemented. Boards should never be used for flooring a cellar, as they soon become damp and moldy, making such houses very unhealthy to live in. Mr. Garduer, in his treatise on Farm Architecture, expresses the following opinion on this subject:—

“By careful draining, it is possible to make a soil naturally wet fit to live upon.

Where any doubt exists, the entire site should be thoroughly under-drained. The foundation-walls should be solid; that is, laid in cement and mortar.

An enterprising rat with a large family on his hands will destroy more in a single winter than the whole extra cost of the mortar.

‘Pointing’ the face will not answer; it will stop ‘nearly all’ the holes, but add nothing whatever to the strength of the masonry.

There are several good reasons why the first or principal floor of a house should not be too high up in the world. From the picturesque stand-point the lowly estate is decidedly preferable, especially as the underpinning is usually treated. But other reasons for keeping the living-rooms well above the surface of the ground are too important to be disregarded.

A free circulation of air and plenty of light underneath the first floor are indispensable to the best sanitary condition. These can be most easily secured when at least half the cellar or basement story is above the ground.

The porch and the main entrance-hall may perhaps be upon a lower level.

For warmth and dryness, the cellar-wall above the ground, commonly called the underpinning, should be hollow—two thin walls of stone or brick, or one of each.”

With respect to improving cellars of old buildings that are dark, damp, and moldy, the same writers says:—

“Dig a trench around outside nearly to the bottom of the wall, or at least until the stratum of earth is reached that holds the water, and girdle the foundation with a drain of horsehoe-tiles, having one or more free outlets. Refill the trench with sand, gravel, or cinders, and cover the top with several inches in depth of clay and loam pitching sharply away from the house, and lay a shallow, open gutter of concrete or cobble-stones to catch the water from the roof, if there are no eave-spouts.

If the cellar is not deep enough for the modern furnace or steam-heater, and the walls do not extend below the cellar-bottom, build a new wall of bricks or stones two or three feet inside of the old, and below the cellar-bottom, leaving a sort of platform for bins, barrels, and boxes around the edges, and dig the rest two feet deeper. By this means the old foundations are not disturbed, and the whole can be done in cold or wet weather.

When the old house rests so closely upon the earth that no sunlight enters the cellar through the narrow windows, and the cellar cannot be raised without great expense, nor the earth be removed around it, then build semicircular areas of bricks about the windows, and make the windows themselves large enough to admit plenty of fresh air and sunlight under the house. Darkness is the first station on the road that leads to dampness, decay, disease, and death. This is true of the new house, as well as of the old.”

The present custom of constructing cellars smaller than the area covered by the house, and also of placing the building higher up from the ground, is a great improvement upon the old-time method of extending large, deep cellars underneath the entire building, and setting the house so low that it was nearly on a level with the soil. Very large cellars, which are unnecessary, are thus prevented from becoming the storage of waste materials, which, by a slow process of decay, would render the buildings above them exceedingly unhealthy; but by being elevated higher from the ground, more light and better ventilation are secured. The cellar should, however, be of the same dimensions as the house in one direction for the purpose of securing a good ventilation.

It is a good plan to remove the turf from that portion of the earth which is to be covered

by the building where the cellar does not extend, fill in to the depth of several inches with gravel, afterwards covering with cement. This prevents, in a great measure, the gases that arise from the earth from making their way into the building. Arrangements should also be made in the underpinning, in such places, for permitting a free circulation of air, by leaving spaces or openings, or the unhealthy gases that are carried underneath the building will surely find an entrance. The timbers will also soon be affected with dry rot, if such places are not properly ventilated.

The cellar-walls should be well cemented, and the ceiling lathed and plastered. This latter will render the rooms above warmer in cold weather, and the floor less liable to admit the gases from the cellar, while a well-built and carefully-cemented wall will exclude rats, mice, and other vermin.

There should be several windows in every cellar for the purpose of furnishing light, and a free circulation of air. Additional ventilation can also be secured by means of an aperture connected with the chimney. A wire netting should be placed over the windows to exclude rats, mice, and insects when the windows are opened. There should be broad, well-lighted stairs leading from the kitchen, or near it, to the cellar, also stairs leading from the cellar out of the building.

Darkness and dampness should be excluded from cellars, and they should also be kept free from any decaying substance, such as rotten wood, decaying vegetables, &c. It is not well to use the home-cellar as a place of storage for very large quantities of root crops, such as for feeding stock. It renders a house unhealthy. A barn, or root-cellar should be used for this purpose.

**Water-Closets and Vaults.**—When properly constructed, water-closets are the most complete arrangements for their intended purpose that can be found. But few farm-houses are, however, so arranged as to admit of their use. In such as have the facilities, they are not only a great convenience, but also conduce to sanitary measures as well. They should always be furnished with a good supply of water. When a tank is used for supplying water for this purpose, it should be large enough to hold from seventy-five to one hundred gallons, and should be, at least, from seven to eight feet from the floor.

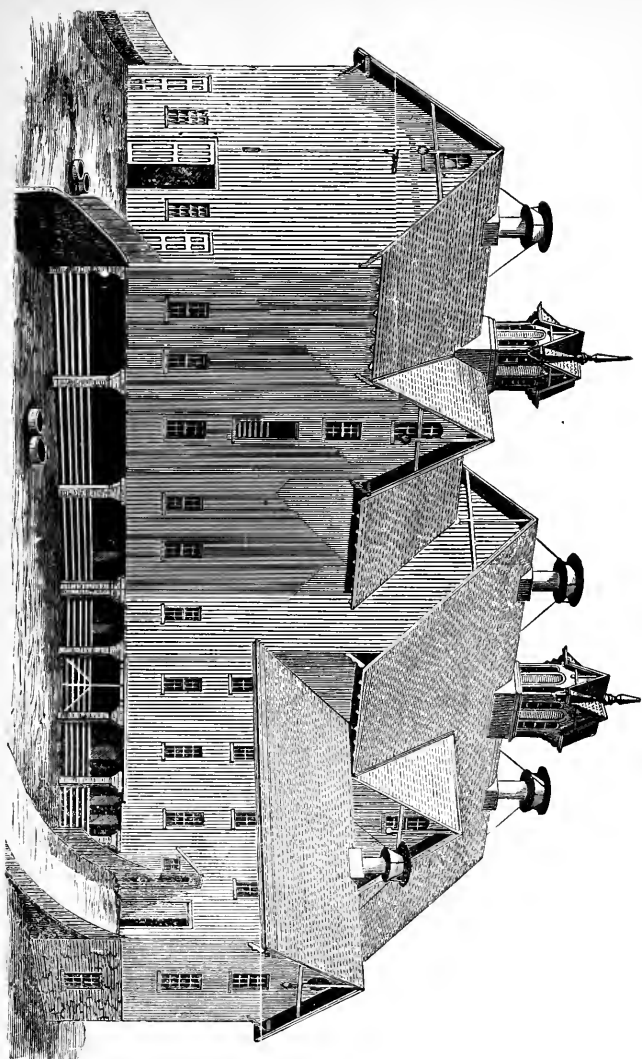
In order to be arranged, on good sanitary principles, water-closets should always be supplied with strong lead traps underneath, which shall prevent the escape of gases. These should run into large cast-iron pipes which should communicate with the sewer. Unless the utmost care is used in providing a sufficient number of suitable traps, such closets become the source of serious annoyance, and unsanitary conditions in a house, being the means of conducting the poisonous gases from the sewage directly into the building. In constructing them the most competent workmen, those perfectly familiar with their business, should be employed, and the work thoroughly performed.

It is easy to have it well done at first, but generally a difficult and expensive task to have any mistakes corrected, or repairs made afterward. Care should be used to prevent the water in the pipes from freezing in the winter.

Earth closets are also used to a considerable extent in many localities. These are most of them provided with an automatic arrangement for throwing down a quantity of sifted earth. But on the farm, and in connection with farm buildings, such conveniences are very rarely seen; the most indifferent arrangements for the family use in this respect being unfortunately commonly provided.

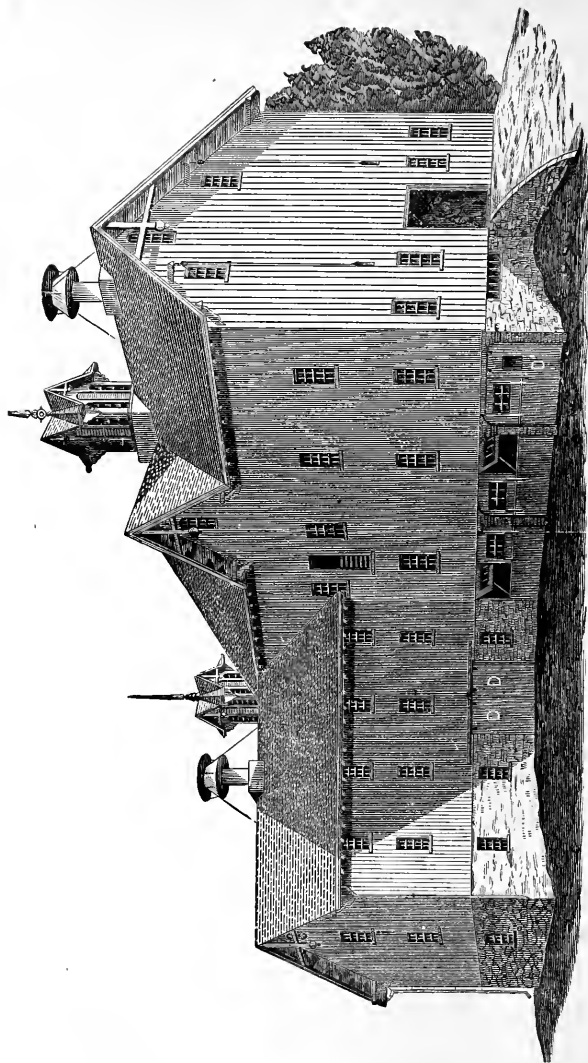
As a general rule, such conveniences in the country consist of an old dilapidated building, located at a distance from the house, and in an exposed locality, so that it cannot be reached in stormy weather, or at any time without exposure to health or observation.

No means are provided for deodorizing, hence such places are a source from which poison to the air and water in their vicinity emanates, thus becoming the means of sowing the seeds of disease and death.



MODEL BARN.—Southeast View.

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MODEL BARN.—Northeast View.

An immense amount of evil is wrought, year after year, simply through indifference and carelessness in this respect on the part of those having charge of the farm management. Typhoid fever, diphtheria, and the many diseases and ills arising from blood-poisoning are often directly traceable to this source. Ignorant of the origin of the evil, no effort is made to remedy it by the family, but that only resort, the doctor, is usually sent for, who may himself be equally ignorant of sanitary laws, or, if not, may perhaps be too ambitious to secure a patient to point out the real difficulty; consequently pills and powders are administered until the unfortunate victim either dies or eventually recovers, owing to his good fortune in possessing a constitution sufficiently strong to counteract all the unfavorable conditions. Intelligent and honest physicians, of which there are many, will investigate in order to ascertain the real and true cause of the evil in such cases, and then point them out, and advise the remedy.

Those who drink water that has been contaminated or poisoned in any way cannot fail of being injured by it, although there may be cases, and probably are, where persons may live to old age, and continue to use such water without any apparent injury. There are exceptions to every rule. There are persons who may be exposed to the small-pox, or other dangerous and contagious diseases, who may chance to escape taking the infection, but such cases are very rare, and are the exception, rather than the rule. Because one person in a hundred might do it, is no reason why the other ninety-nine should run the risk of exposure.

It is the positive testimony of the best medical authorities, that many deaths, and a large percentage of sickness, are caused by unsanitary conditions. When vaults are located near wells, the soil may for a time prevent the evil, by filtering the drainage from such sources; but after the soil has itself become saturated with the poison to a great extent, it cannot purify the water passing through it, hence is the means of conducting it directly into wells that may be located near. By a little care and skill, the evils attending the use of such closets can be avoided.

They should be so located as to be accessible without going out of doors, if practicable, also hidden from the road. If this is not possible, a high tight fence, thick hedge of evergreens, or grape-vine arbor should be made a shield for the walk, while a rustic frame of lattice-work would screen the entrance, over which some kind of climbing vine might be trained. Such unsightly places can thus easily be rendered other than a blemish to the premises at a slight expense, and but little care and labor.

The best vaults are those that are cemented at the bottom and sides. A vault should be closed by a door made of heavy plank, and so hung on hinges that it can be readily opened and hooked up out of the way when it is being cleaned out. Gas-tar, or a similar substance, should be used for coating the inside of the door, while the outside should be painted, by which means it is rendered more impervious to moisture. A little dry road dust, muck, or coal ashes thrown in every two or three times a day, will prove a good deodorizer and absorbent.

A barrel or cask containing this material might stand in the closet, and when farther provided with a long-handled dipper or a small shovel for the purpose, such material could be conveniently thrown into the vault, which would certainly be a cheap and easy way of rendering it inoffensive, and of avoiding the evils that now so commonly attend such places. In this way the liquids are absorbed and prevented from filtering into the soil, while the entire contents are deodorized. No soap-suds or other slops should ever be turned into the vault, but it should be kept as dry as possible, with the absorbents used.

**The Barn.**—As commonly appropriated, farm barns are used for the protection of stock against inclement weather, the storage of their food, the manufacture and preservation of fertilizing materials, and the storage of farm machinery. Aside from these considerations, the convenience in performing the barn work should also be taken into account in construct-

ing a barn. On very large farms necessitating the extensive use of farm implements, a separate building is sometimes required for their storage.

A good barn is one of the great essentials on a farm. In newly-settled sections, they are sometimes dispensed with for a time, until the land can be put under cultivation, and the owner is able to erect the necessary farm buildings. This is frequently the case in the far West, but even under such circumstances the most thrifty and enterprising farmers will not be long without a barn, and those which are the most enterprising and prosperous will generally erect the best farm buildings and keep them in the best repair. As a general rule, the barns of the Western and Southern portions of the country are not equal in architectural structure and convenience to those of New England and the Middle States, although many portions of the older-settled sections of the West are fully equal in this respect to either of the latter mentioned. Next to a good farm house, a good barn is essential, and no farmer can afford to be without one which should be of sufficient size for all the purposes to which it is to be appropriated.

While large barns are more expensive than small ones, and a surplus of room in this respect is therefore a lack of economy, yet it more frequently happens that barns are too small, rather than too large, and the owners are obliged to be subjected to great inconvenience for this reason, or be at the expense of building others, or enlarging the original. A large number of small buildings on a farm are a blemish and an unnecessary expense, and it is better in every respect for the farmer to build one barn of sufficient dimensions for all the practical uses on the farm, than to be obliged to build two or three small ones.

The size of the barn must, of course, be proportionate to the size and productiveness of the farm, and the number of animals to be furnished comfortable quarters. Even in latitudes that do not essentially require the housing of stock during a portion of the year, animals that are kept stabled a part of the time are more valuable, as they have better care, and are more gentle and therefore easily managed, while they can also be fed with less waste of material, and the fertilizers they produce can all be saved with little care, which is no small consideration when we take into account the value of well-composted manure to the farmer. In those latitudes in which the ground is covered with snow a portion of the year, the barn should be large enough to accommodate all the stock on the farm, and their fodder. Animals that are not protected from the cold require more food than those that are, since much of the food which they consume goes towards the production of animal heat, and unless enough food is given them to satisfy their hunger, this extra demand reduces the supply for repairing the waste of the system; consequently such animals will not only consume larger quantities of food, but will grow thin in flesh and present an emaciated condition in the spring. Young horses and cattle are frequently stunted in their growth by this means.

On the other hand, stock that are provided with warm, comfortable quarters, will consume less food, and be kept in a thriving condition during the winter. Diseases are also more frequently prevented, and more easily cured under such conditions. Cows that are kept in warm stables will give more milk and of better quality than those that are not comfortably housed. This truth is so apparent, that it requires no argument to substantiate it. It is therefore a practice of economy, as well as humanity, for the farmer to furnish food and good shelter for his stock.

Where ensilage is used extensively for feeding animals, less room will be required in the barn for the storage of hay. Hay may be stacked in the field, thus rendering less room necessary in the barn; but hay that is thus exposed to the weather, is greatly inferior to that which is stored; besides, stacking involves much waste. A great advantage in this respect will be found in baling hay, as it will then occupy much less room than otherwise. In building a barn the farmer should have as definite an idea of its use, and the necessities for its convenience, as in building a house, and in many respects what will apply to the one will, with slight modifications, apply to the other.

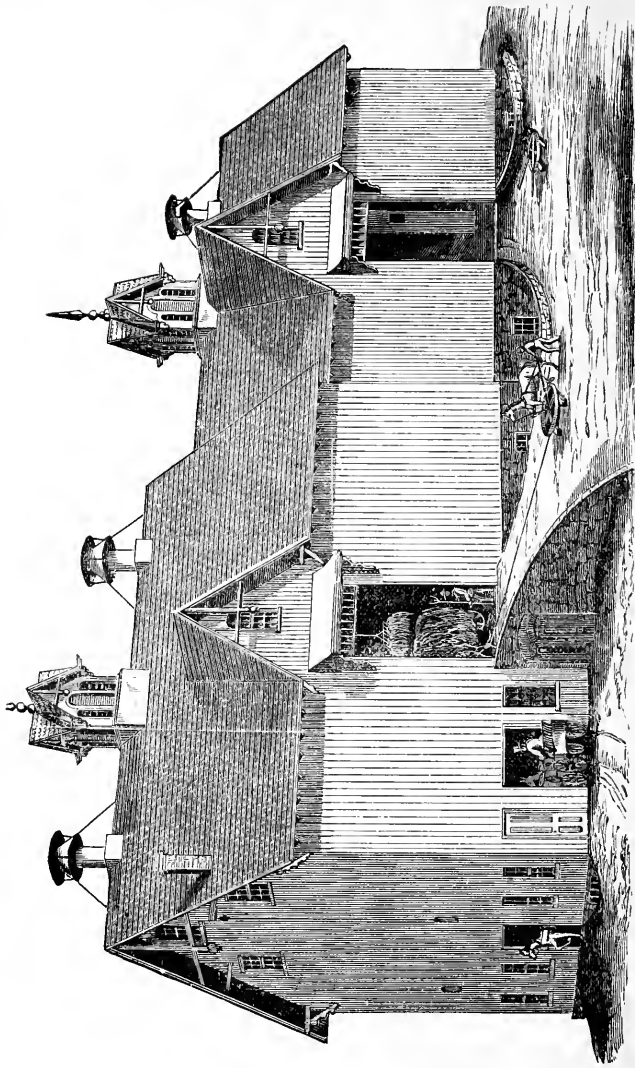
In a large portion of the country it will be necessary to build barns in a manner to secure warmth; hence, they must be tightly covered and the floors well laid, that the cold air may not blow in upon the animals. At the same time, good ventilation must be maintained. While warmth is essential in a barn for the comfort and thrift of the animals, it is better that the barn be cold, and good ventilation secured by air blowing through the cracks and about windows, rather than that the animals be made to constantly breathe the offensive and tainted atmosphere of an ill-ventilated building. Many of the diseases to which cattle and horses, as well as other domestic animals, are subject, are due to overcrowding and the breathing of the poisoned atmosphere of badly-ventilated stables. Cattle kept in such enclosures cannot be healthy, and are totally unfit to become food for mankind.

**Location of Barns.**—The barn should be located at a convenient distance from the farm-house, but sufficiently removed to prevent all contamination of air and water. It should never be placed upon ground higher than the house, in such a manner that the drainage from it, either on the surface or in the soil, will be able to reach the cellar, well, or the surroundings. Unless on a level, with the house, the barn should be placed on a lower level, if practicable. The location should also be so chosen that the drainage from the barn-yard shall flow upon the farm lands, that they may receive and absorb all the fertilizing elements that may be washed from the yards in heavy storms, etc. We have frequently seen barns built upon a road side, with a slope towards the highway into which all the wash from the yard is carried, year after year. By this means much of the fertility that might be derived from this source is lost to the farm. This may seem a small matter to those farmers who till the prairie soil, possessing such a wealth of fertility that it requires no fertilizer in addition, for the production of vast crops; but to the farmer whose soil is of such quality that it necessitates such a large supply of plant-food applied every year to render it productive, that it is difficult to preserve, or secure the requisite amount, it means considerable.

Other important considerations are involved in the location of a barn, such as the health and comfort of the animals to be stabled in it; consequently dry land should be chosen, and damp localities avoided; also cold, bleak sites, or those that are inconvenient of access in hauling loads to and from it. The old-fashioned custom of building a house on one side of the highway and the barn on the other, nearly opposite, should also be regarded as obsolete, and a better one substituted in its place. Frequently a locality will be found admitting of a basement partly under ground, which will furnish the best facilities for a root-cellar, as well as for other purposes.

**Plans for Barns.**—We shall not attempt to furnish plans that will meet in all respects the wants of the builder, as this would be an impossibility, since the ideas, wants, and tastes of each individual farmer differ so materially in this respect; but rather to give a few general plans that may serve as suggestions and hints to the farmer in better determining his own wants, and in carrying out such ideas in practice as shall subserve to fully meet those wants in the most convenient and economic manner. While some of the plans of model barns that have been inserted may prove quite too expensive for the ordinary farmer to follow in detail, they may serve to suggest in certain respects what might be done on a smaller scale, and but little or no more expense involved, than in the construction of many of the inconvenient, uncomfortable, and uncouth structures called barns, that we so frequently see.

Utility is one of the main considerations in constructing a building, and those are the best that are best adapted to the purposes for which they are to be appropriated, whether they cost much or little. Expense does not necessarily imply utility. We have seen barns costing several thousand dollars that would not afford room enough for more than half a dozen cows and three or four horses. These barns were highly ornamental in finish, with



MODEL BARN.  
(Northwest View.)

artistic gables, cupolas, etc., and with an abundance of room for the non-essentials, but with little room for the special purposes for which the barn was to be used. Ornamentation is desirable to a certain extent, but it should be of minor consideration when compared with subserving in the best manner the purposes of a building.

On the other hand, we know of barns very convenient in every respect, with ample room for the stabling of a large number of farm animals and the storage of fodder and roots, costing but a small portion of the former structure referred to, but which, for utility and convenience, were worth more than ten times the former. Good judgment and skill are highly essential in planning a barn that will subserve the best purpose. The old system of placing small buildings in a hollow square, has been gradually succeeded by that of placing as much as practicable under one roof. This is not only more economic but more convenient. The advantages thus gained are, greater height or depth of bays under the roof for the storage of hay or other fodder, increase of storage, economy in constructing, and economy in labor by having the animals and feed so nearly arranged together. Greater warmth in winter is also secured in this manner. One good, large barn conveniently-arranged, is far more convenient, besides being much more economical in labor and money, than two or three small ones, the combined capacity of which might exceed somewhat that of the former.

The three accompanying plates are representations of different views of a barn located in Connecticut, and which in many respects might very properly be termed a model barn, with reference to the purposes for which it was designed, although subject to improvements, perhaps, in some of the minor details. This barn is adapted to all sections—east, west, or south, and shows how space may be economized in planning a building for the various purposes to which a barn may be appropriated; also how the health and comfort of stock should be considered. It is probably a larger and more pretentious structure than many farmers would require; however, it may furnish a model for a smaller and less expensive building, or may suggest improvements upon other plans. The barn stands upon a side-hill which slopes to the east. It has three distinct floors, the structure consisting of a main building and two wings. The main building is 55 by 80 feet; the east wing, 56 feet long and 31½ feet wide; the south wing, 56 feet long and 35 feet wide,—the total length from north to south being 136 feet.

In constructing any building, it is well to see many models and study various plans, and then select the best they contain for the desired purpose, and combine them into one, unless a better combination can be originated.

The southeast view of this building shows the cattle-yards, both wings, the cellar, etc. Each yard is supplied with iron tanks, which are kept filled with constantly-flowing water for the stock.

The fence and gates which shut off the cellar from the yard are movable, the posts at either end being stepped into sockets. By this means, they may be quickly and easily removed, and the cellar and yard thrown together, thus giving the cattle while in the yard shelter from the cold in winter and heat in summer. Any portion of the cellar may in the same manner be fenced off or opened into the yard.

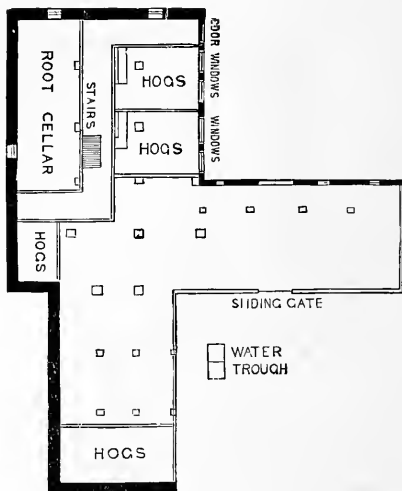
The northeast view shows the east wing and the cellar or basement wall, with the doors and windows connecting with the pig-pen, etc. The doors (D) are suspended on rollers upon which they slide. The windows are suspended on hinges from the top, and swing open inside.

The northwest side of this building contains the principal embankment, which furnishes facilities for reaching the second floor, with room for power for raising and carrying hay and other feed; also, the horse-stable and entrances to two floors. The drive-ways to the hay or storage floors rise gradually to the required height, and are walled up by substantial masonry. The hay and grain lofts are furnished throughout with facilities for raising and carrying loads, there being no less than six railways for the travelers carrying the forks to run upon,

The following represents the ground plan of the same building. The heavy black lines indicate the stone wall which supports, in part, the bank of earth on the up-hill side. At the ends, where the cellar-floor is about on a level with the surface, the wall is laid two and a half feet lower. Under the outer edge of the walls the drains are laid with a grouting of stones and cement over them, which prevent any undesirable effects of frost.

The entire floor is grouted three inches deep with stones, covered with gravel, which has a coating of cement.

A root-cellar 18 by 50 feet on this floor affords storage for about 6,400 bushels of roots, secure from frost, yet sufficiently cool to preserve them well. The arrangements are such that the roots may be put in by chutes. This cellar may be sub-divided into three or more bins, as desired.



GROUND PLAN.

The following diagram represents the plan of the stock or feeding-floor and yards. On the right of the western entrance of the building is a carriage-room with capacious sliding doors. On the left is a harness-room, in which is a stove for making it comfortable in cold weather. Directly in front are the horse-stalls, and space where horses may be cleaned, and horses harnessed to vehicles may be tied.

There is a clear passage from the north to the south end, through the building, the stairs being so arranged that they may be lifted and fastened up out of the way.

The wings are occupied by cattle stalls, those in the south wing being wide, and calculated for fattening oxen; those in the east being intended for cows and young stock. There are also three loose boxes on this floor,—one of which is 12 feet square, and two somewhat smaller,—which may be used for horses, or as lying-in stalls for cows.

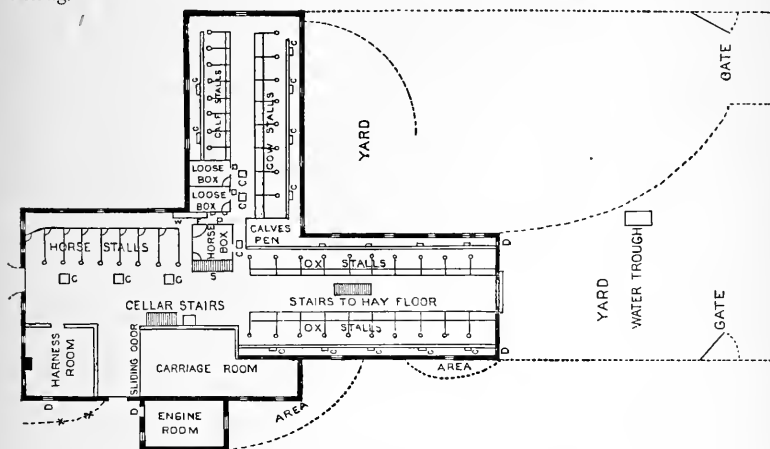
In the rear of the cattle-stalls, a double line indicates the channel for collecting liquid manure. The points marked C are openings through which the manure is dropped into cellars. The letter W shows the location of the water-trough, and F the trough for mixing the feed. D represents a door through which the cattle have access to the yard. Under the drive-way is an arched vault, which is well lighted, and fire-proof, which forms a very convenient boiler and engine-room, with space for the storage of fuel.

The steam-pipes for cooking the feed for the stock pass through holes in the wall upon the feeding floor. Steam power is employed for threshing, sawing, fodder-cutting, etc. the waste steam being used for steaming hay, roots, etc., the engine-room being contiguous to, and below the threshing floor.

The storage-floor contains the hay, grain, straw, and stalks. Two threshing-floors, 16 feet wide, cross the building, being entered from the west. Here are hay-scales, and hay-cutters. Each grain and meal-bin communicates by a chute with the feeding-floor, where its contents may be drawn off. From this floor there are stairs that ascend to the cupola.

The stables for stock are airy and roomy. The horse-stalls are ten feet from front to rear, a little more than 5 feet wide, and 9 feet and 4 inches high. They are separated by plank partitions  $4\frac{1}{2}$  feet high, surmounted by wire netting, which extends 2 feet higher. The same kind of partition also forms the front of the stalls.

An iron hay-rack is located in one corner, and an iron feed-box in the opposite corner, which is accessible from the passage-way in front of the stalls, by a small door in the wire netting.



GROUND PLAN OF FEEDING-FLOOR AND YARDS.

The stalls contain two floors, the lower one being laid of two-inch chestnut plank, with cleats half an inch thick covering the cracks between the planks. Upon this water-tight floor is another made of three parts; two feet of the upper end is made of white oak plank nailed fast. The remainder of the floor is formed of narrow oak plank, fastened together by strong oak cleats in such a manner as to form what is similar to two doors hinged at either side, so as to be lifted and set up as shown in the cut. This arrangement is designed for the more perfect cleansing of the lower floor. A channel at the rear carries off the liquid manure, and the solid manure is thrown into the cellar, through the trap-door seen open in the illustration of the horse-stalls, and indicated by C in the diagram of the feeding-floors.

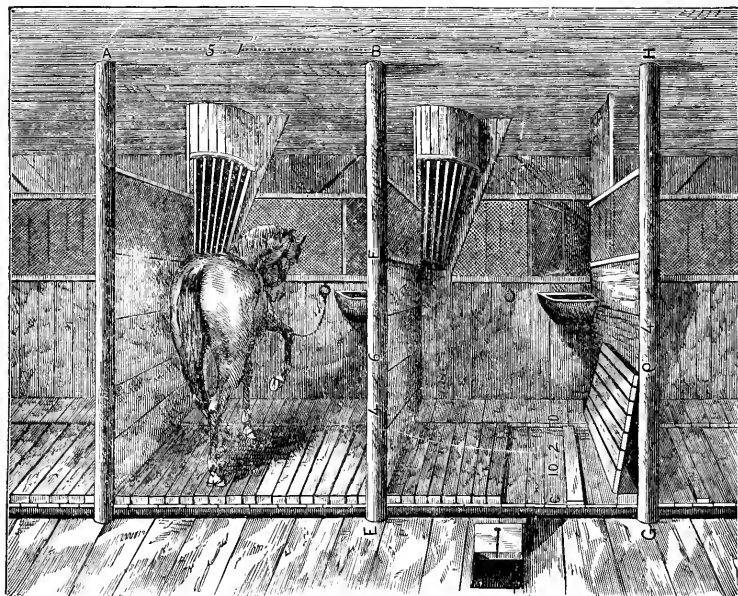
Between the cattle-stalls, in the south wing, is a passage-way ten feet wide, through which carts with green food, roots, &c., may be driven. This arrangement favors a system of soiling in summer when desired. There is also a similar passage-way through the east wing, all the cattle-stalls being made upon the same principle, although of different sizes, being

designed for fattening cattle, milch cows, and young stock. The feeding-boxes are  $2\frac{1}{2}$  feet wide, the floors  $5\frac{1}{2}$  feet from the feeding-trough to the gutter (which is 14 inches wide), and the rear passage is 3 feet, making about 12 feet in all for the stalls.

These stalls are  $6\frac{1}{2}$  feet wide, and designed for two animals, which are fastened by a neck-strap or chain, which is attached to a short chain and ring playing up and down upon a rod bolted to the partition between the stalls, thus permitting a free movement of the head.

The rack in front of the manger is perpendicular. A shutter is hinged below it which, when open, is held in an inclined position by a chain. By this means space is given for hay being passed between the shutter and rack.

This building is well lighted and ventilated. Ventilating trunks, four feet square, extend from the feeding-floor to the roof, where they each terminate in a large ventilator. The



HORSE-STALLS.

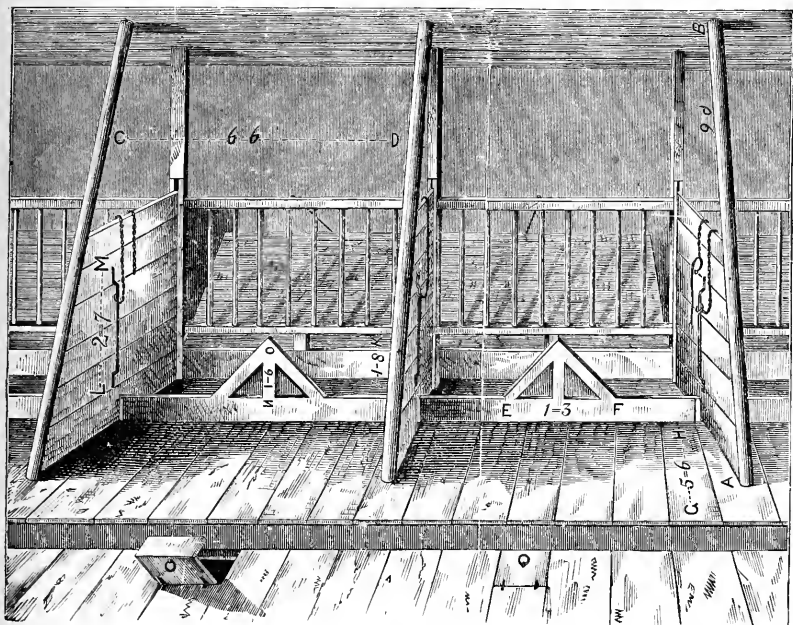
windows on the stock floor are numerous, and are each provided with two glazed sashes hung by weights, so that they may be opened and held in position as desired, making it very cool and airy in hot weather. The yards extend to the south and east.

The water from the eaves is all conducted off, so that none comes into the yard. The water for the stock is supplied from an unfailing source, and is brought in pipes to the yards and stock department of the barn.

Whether a barn be large, or small, much may be gained by way of convenience, and the economy of room and expense, by having a good plan for its construction.

A recent writer gives his method of building a bank-barn as follows: "I would say first, that 36 or 40 feet is ordinarily as wide as it is practicable to build a barn. Additional room can be made up in length, if desired. If there is much of a bank, more depth

of basement might be desired, which would be good economy up to 10 or 12 feet, if it is found that the grade will permit. This will allow better ventilation, more security from frost, and room to allow 2 or 3 feet of manure to accumulate under foot, if desired. It will keep in good condition if trodden down as made, but will not freeze to hinder its being drawn out at any time. After digging the cellar, and it is ready for the wall, dig a trench as broad as the wall is to be, and 18 inches deep. Fill this with small, loose, broken stones. Boulders broken up somewhat as they are put in are best, but chips from the stone-yard will do. Fill the trench even full, and on this commence the wall. In case a drain is needed, it should go from the bottom of this trench, but the principal use of this trench is to make the cellar rat-proof. The idea is that rats, after digging down to the bottom of the solid wall,



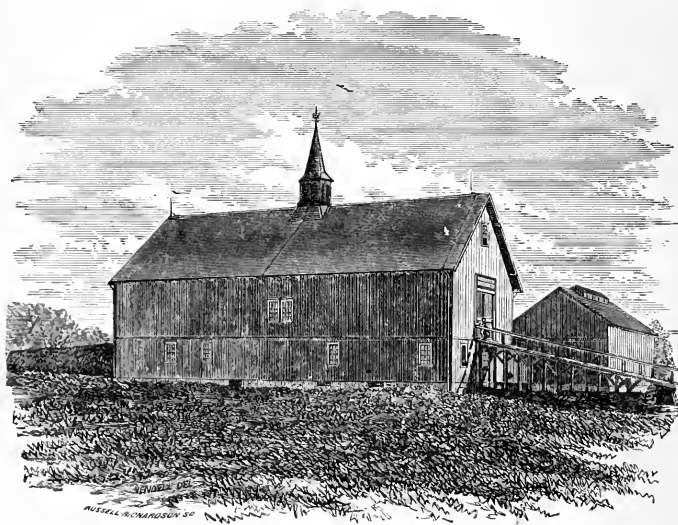
COW STALLS.

find they cannot then get under it through the broken stone, and so abandon it. In practice this has proved effectual. Have the cross sills so heavy and strong as not to require many supports, which would obstruct the free driving of teams around in the basement.

In getting the frame timber, much care should be used to get very stiff, strong beams for the gable ends of the barn, as in barns of such breadth there is great danger of the ends bulging out too much after the bays are filled. The best timbers for the girts are obtained by taking larch or tamarack, from 8 to 10 inches through, and having them sawed through the middle at the saw-mill. Shave off the bark, and use the straight side to nail the siding to. The rounding side next to the mow makes it better and stiffer than common square timber. For sleepers, take elm logs of the proper length, and 12 to 18 inches in size, sawed like the girts, and always peel before using.

This is the most practical and economical way of furnishing timbers for this purpose. I would advise to have the roof steep; it gives many feet more space without much more cost; is not so apt to leak, and will last better, because it dries off quicker after a rain. Instead of ridge-boards at the top, I would always use tin. Use a strip 10 to 12 or 14 inches wide, made as long as the barn, put in a roll; then, after the barn is shingled and ready, nail the tin as a cap over the ridge. It will answer a much better purpose than boards.

The use of well-seasoned lumber is one of the most important things about building, and too important to neglect, even in making a barn. When building a barn a few years ago, 36 by 100 feet, and 24-foot posts, I selected old, well-seasoned, sized lumber, 1 by 12 inches, and had it dressed to order. The thickness was so good that I had it dressed a full inch, instead of seven-eighths, as it always is in market, and the width overran nearly enough to make up the waste in matching, so that 37 boards would cover the 36-foot end of the barn.



FARM BARN.

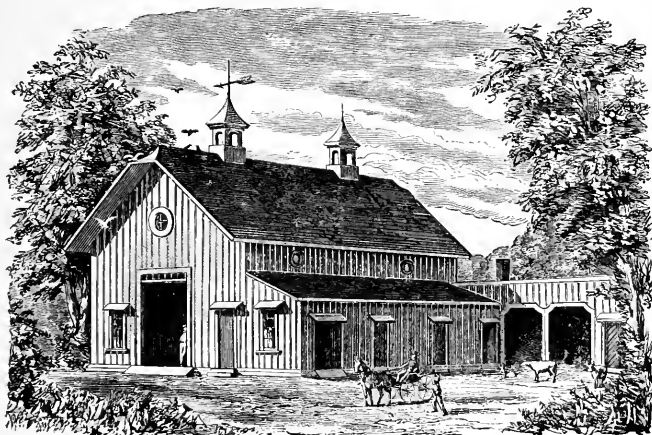
These wide boards have not warped, and their joints have not opened as much, as siding of half its width often does.

The arrangements about such a barn will not be complete without a good cistern, unless it has a better natural water supply than one barn in twenty can have. To insure a good supply of water, build a large cistern in the bank on the upper side of the barn, and have a pipe go from near the bottom of the cistern through into the basement of the barn, so that water can be drawn by a faucet. Then a pump over the cistern will furnish water for use above. This I have found to give an almost unfailing supply."

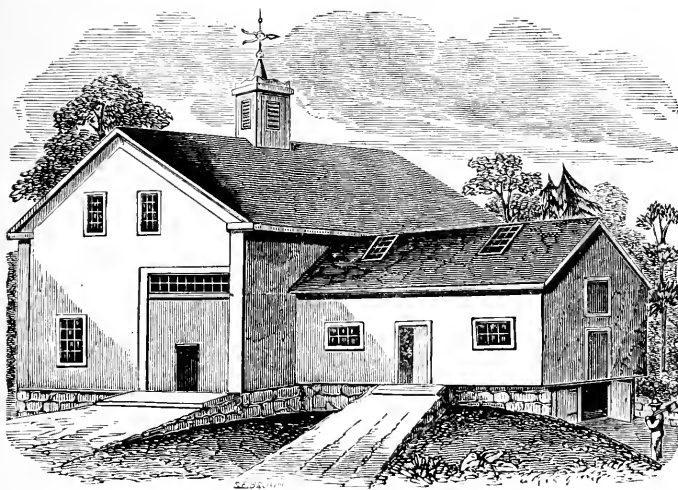
It has been estimated by those who have given the subject of economical farm buildings considerable attention, that a basis upon which the lowest possible cost of building a barn may be calculated is about \$10 per head for each horse or cow that it will accommodate with comfortable quarters, and about the same per ton for the safe storage of all crops grown upon the farm. This will, of course, be subject to variation, and admit of considerable

latitude, but may answer as a basis upon which to calculate the lowest expense of building a cheap and convenient barn suited for common farm purposes.

The expense of building-material varying, as it does, in different localities and at differ-



DAIRY BARN.



CHEAP DAIRY BARN.

ent periods, as well as that of labor, only an approximate estimate can be reached. It is necessary to have a wide and solid stone foundation in building a barn, and especially so at the lower side when a bank-barn is built, in order that the sills may lie solid and firm.

Barns and sheds should be well raised on substantial underpinnings, in order to prevent

the rotting of the sills, and admit of the escape of moisture underneath, which would cause the timbers to decay, and also render the stables damp and unhealthy for stock.

While a barn that is externally unattractive may be made internally comfortable for the stock that it shelters, and also to furnish good storage for crops, still there are many reasons why the farmer should endeavor to give his barns and other farm buildings a neat and attractive appearance. A symmetrical barn that is an ornament to the premises will go far towards making the surroundings of a home attractive. It also indicates enterprise and good taste in the owner, and will exert an influence for good on the younger members of the household, causing farm-life and home to be more attractive to them; besides, the same enter-

prising taste will be very likely to be exhibited on all the other portions of the farm, and better fences and improved farming will be the result.

All farm buildings should be constructed in such good taste that they will harmonize with the surrounding landscape, and not prove a blemish to it. A tasty barn need not necessarily be an expensive one. A symmetrical



FIG. 1.

and attractive form, though covered with rough boards, will be far more pleasing and attractive than the most highly-finished building with a disproportioned and awkward outline. Rough, unplanned boards may be made to look very well by applying first a heavy coat of crude petroleum, and afterwards a coat of some of the many kinds of paint that will adhere well. Shade trees around a barn add to the appearance of the surroundings, and will furnish shade to the cattle in the yards during the summer, but they should not be so near the building as to shade it and intercept the sunlight. All buildings should have the sunlight admitted freely for the sake of health, and also for the warmth afforded by this means in colder latitudes, in winter.

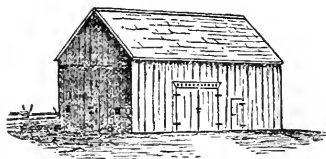


FIG. 2.



FIG. 3.

Shade-trees are an ornament to any building, but they must be sufficiently removed to prevent the obstruction of the sun's rays. When trees near a barn or other buildings are interspersed with evergreens, a great protection is thus afforded against the fierce winds of winter. The expense of building a tasty and somewhat ornamental structure will not much exceed that of an excessively plain and unattractive building. Projecting eaves are a benefit as well as an ornament to a building, while ventilators at the top,—which are highly essential where animals are kept,—can be made to subserve an ornamental as well as useful purpose, and will cost but a trifle. The above cut,—Fig. 1,—representing an attractive, two-story barn, is given in striking contrast with Fig. 2, which illustrates the perfectly plain buildings so commonly seen on the farm. Such a building as this represents does not add to the

attractive appearance of any farm, and yet, with a slight additional expense in constructing, it might have been made quite the reverse. Fig. 3 is a very good illustration of the same building after the lapse of years, without repairs having been made. Too many such old, dilapidated buildings are to be seen in all sections, and, wherever located, are a standing testimony of the negligence and general shiftlessness of the owner.

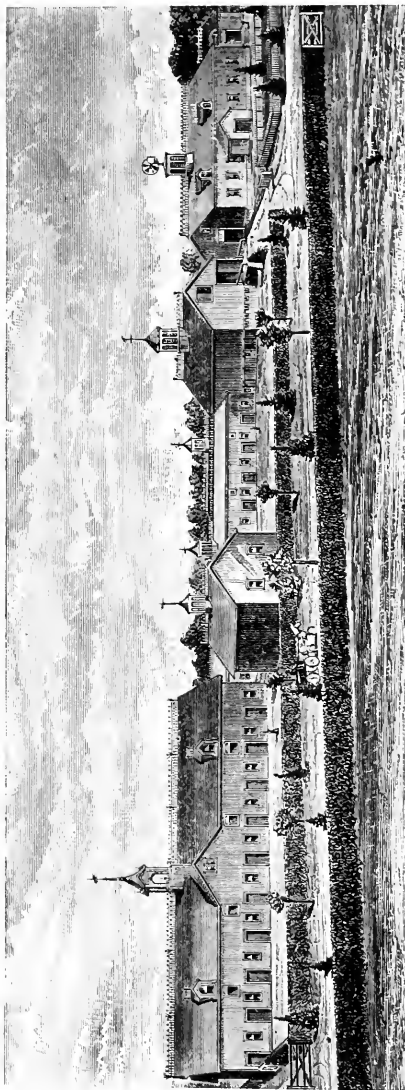
If any farmer sees in this latter cut a good representation of any of his own buildings, we hope he will consider carefully the benefits to be derived from a better index of an improved style of farming, and soon proceed to complete the work of demolishing what time has so nearly demolished, and substitute a more commodious, useful, and attractive barn in its place.

**Horse Barns.**—The illustration of farm buildings on the next page, representing the very extensive horse barns of one of the largest importers of horses in this country, will be found to be quite beyond the requirements of most horsemen; yet the plans they present are the result of long experience and careful investigation. As such, they may prove valuable in suggesting plans and improvements that may be modeled on a smaller scale, and which, with slight modifications, may be adapted to any kind of stock. The description of this barn is by the owner, Mr. Dunham, as follows:—

Barn No. 1 is 160 feet long by 52 feet wide, with an awning adjustable 10 feet wide, to raise and lower. The foundation is of stone, laid below frost; bottom of wall 16 inches, top one foot in thickness. The wall is laid on the east, north, and west sides, and one wall of the same dimensions is laid 16 feet from the north wall and parallel to it. Cross walls, 10 inches thick, support the partitions of the box-stalls. The south outside foundation consists of piers 20 feet apart, 4 feet square on the bottom and 20 inches square on top, with cap of cut stone, 20 inches square on bottom and 12 inches square on top, to receive the post. Sixteen feet north, and parallel to this line of piers, is another line built in the same manner. The building is constructed, as will be seen (by position of wall), with four rows of posts—the two center rows standing 16 feet from the outside, and 20 feet from each other both ways, extending to the purlin plate, and support the same. The outside posts are 20 feet long, and on the north side are 16 feet apart. All the posts are 8 by 8 inches, and are connected by beams 8 by 10 inches, and 10 feet from the bottom, upon which are laid 2 by 12-inch joists. The two center lines of beams running lengthwise of the building are additionally supported by a cast-iron angle, bolted on the post under the end of each beam, and running down the post and out on the under side of the beam 12 inches. The beams are also trussed on the top, making a solid and safe support for the joists which run crosswise of the building. The roof is one-third pitch, and formed with gables (dormers), and surmounted by a cupola, as shown in the perspective view. The outside is girted with 6 by 6-inch girts, 4 feet apart, and boarded with matched and dressed lumber. The positions of the windows can be seen in the engraving. In the second story there are four doors on the north side, with transoms, and on the south side eight of the same kind. In each end, as high as can be made in the gable, is a door 12 feet high and 10 feet wide, through which the building is filled with hay.

From each door to the center is erected a hay-carrier, as near the ridge as possible. The building is supported by the usual cross-beams and braces. The roof is covered with the very best dry pine shingles boiled in West Virginia oil. To prepare the shingles a vat is used of sheet-iron, 20 inches deep,  $2\frac{1}{2}$  feet wide, and from 2 to 4 feet long, according to the extent of the job. Set the bunches in and have oil enough to come up to the bands; let it boil five minutes, take out, place on an incline with tight bottom and drip back to the vat. In half an hour the other end of the bunch can be dipped, and returned on incline, and in one hour they will be dry. The cost is less than \$1 per 1000. I believe shingles prepared in this way will, with an occasional coating of oil, last indefinitely, as the water will not penetrate them in the least.

The squares indicated in the plans are box-stalls 16 by 16 feet square, with one door



FARM BUILDINGS OF M. W. DUNHAM, WAYNE, ILLINOIS.

double-thick, 4 feet six inches wide, and 8 feet high. Latch, a straight piece  $\frac{3}{4}$  by  $\frac{1}{4}$ -inch iron, 1 foot long, mortised into the center edge of the door, end protruding 1 inch, to catch latch hook; an iron plate with slot for latch to play in is screwed on the edge; an inch hole is bored under the latch, to raise with. One window, 12 lights, 12 by 16 on outside, and one 9-light window, from stall to alley, covered with No. 9 wire screening. The outside window is grated with inch refuse gas pipe, set three inches apart (cost about \$35 per ton); windows hang on weights. The north and south sides of stalls are ceiled with 2-inch matched plank, 5 feet high, and from there to top with 1-inch matched stuff.

The hay-shoot is built in the outside corner, with 2-feet runs, and extends 6 feet above the upper floor, and has a slide-door on the long side, that can be raised, and leaves an opening in the shoot on a level with the floor when desired. The bottom of the shoot is grated gas pipe 3 feet 6 inches long, set on an incline from the corner to the outside of the bottom of shoot, which is 6 feet from the floor of stall. These pipes are set 6 inches from centers at the top, and one of them moves in a slot, so as to double the distance when required.

Under the shoot is a manger, made of oak, with a side-run of 3 feet 6 inches. Its height is 3 feet 6 inches, and ceiled in front to the bottom of stall. In the opposite corner is the grain feed-box, opening into an alley by a slide-door 1 foot 8 inches by 2 feet 6 inches, hung on weights. The feed-box is made the same as the manger, only smaller.

The partitions between the stalls are made by setting 2 by 4-inch stud-

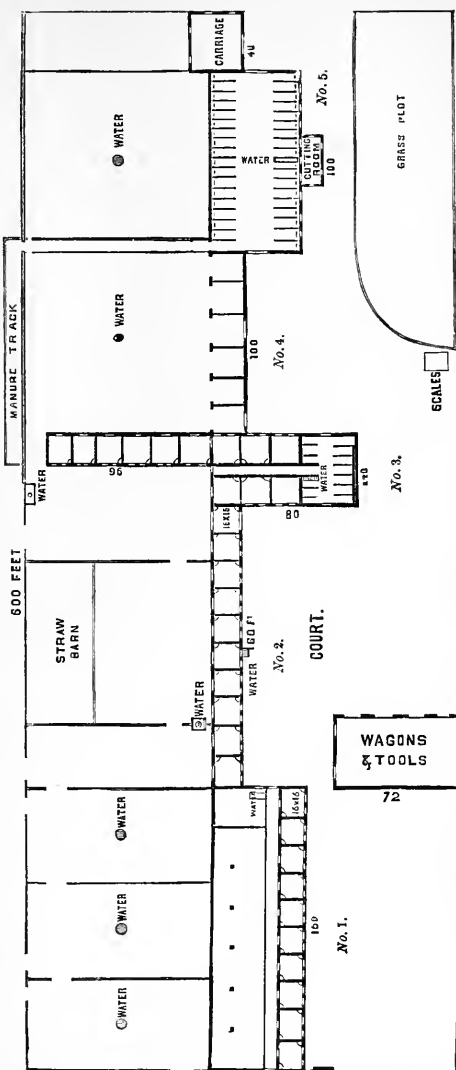
tending 5 feet high. Both sides are then ceiled with common matched and dressed flooring,

even with the top of studding, and an oak cap 2 feet 6 inches spiked on top. The top of this cap has  $1\frac{1}{4}$ -inch holes four inches from center to center and one inch deep, in which inch gas-pipes 3 feet long are inserted, and capped with another oak cap firmly set at both ends. The floors are made of clay and gravel. An alley 6 feet wide runs the entire length of the barn, with manger on the opposite side from stalls.

The large space with posts in center is divided by movable plank partitions 5 feet high, the end bars of which run as high as the beam, and are hung to same with a hinge. These partitions can all be raised to the ceiling, and are held there by four wooden hooks, with the lower parts beveled. When the partition (or door) is raised, the hook is thrown back until the door enters the notch (or hook), which falls over it and holds it. In this way the whole south portion of the building can be thrown into one great shed, or divided into small stalls, and when the awning is down everything is perfectly protected. The yard fences are also made movable by sockets being tamped in the ground to receive the posts, which are tapered, and can be taken out with perfect ease, and the hole plugged.

The bins for feed are made in the second story, and are located directly over the hydrant, at which point a box is located for mixing feed.

Barn No. 2 consists entirely of box-stalls, made on same plan as those described, and open into the yards to the south; it is 16 feet high at eaves, with loft for fodder. Barn



GROUND PLAN OF M. W. DUNHAM'S FARM BUILDINGS.

No. 3 is 40 by 80 feet, 26-foot posts, with 96 feet extension to the south, all boxes, the same as described. The single stalls are 5 feet wide, and made on the usual plan, with plank floors; hay being fed in shoots from above. The upper part is reached by an embankment and bridge. A hay-carrier is also rigged in it, door opening to the north. Large feed-bins are located over north end of the alley, where water is marked; a mixing-box, filled from spouts from bins, is placed beside the hydrant. No. 4 is an open shed facing south, with yard in front.

No. 5 is 50 by 100 feet; stone basement; the walls 26 inches on the bottom and 16 inches on top. The building rests entirely on the outside walls. The sills are 8 by 10 inches; the posts 20 feet long, and about 14 feet apart. The girts are 6 by 6 inches, and 4 feet apart. The roof is a truss-roof of the strongest kind. (See perspective view for location of windows, cupola, etc.) The boarding is of the best dressed and matched flooring. On the north side and center is a cutting-room, 20 by 24 feet, the cutter standing on a level with the second floor (see view). The basement is divided by three 6-foot alleys, running north and south, connected by one 4-foot alley running east and west along the north side. On each side of each alley are four box-stalls, about 12 by 14 feet, with plank partitions 5 feet high, and doors opening from one to the other, to the outside. Hay comes from the third story through shoots opening into the alley, and is fed in mangers.

The second floor is divided entirely into single stalls, as will be seen on the plans; an alley in front of each row for feeding grain and watering. Hay comes from above in shoots, as in the other stalls. The floors are 2 inch matched planks, tarred, and then covered with paper (two thicknesses); on top of this are laid 3-inch planks boiled in oil, and keyed together every five feet. Between the two floors is an iron gutter, just at the back end of the stalls, with iron outlets running down the basement into the ground for drainage. The stalls are 5½ feet in the clear, and the partitions are 3-inch planks, doweled together, 4½ feet high, and the front rises in an oval shape and is barred. The stall-posts are 6 by 6-inch oak; 3 by 12-inch joists run from the stall-posts to the outside of the building, and 2-inch matched planks are used for the floor above, so that the space over the horses' heads is perfectly smooth. The ceiling over the floor back of the horses is 12 feet high and 20 feet wide, with a 14-foot slide door at each end. Over each stall is a finished panel, set with pictures of Percheron horses. The stalls and ceiling are painted in nicely-contrasting colors.

The entire water system is supplied from a 2,000-barrel reservoir or cistern, constructed on a hill 60 feet higher than the barns, and 100 rods away, built of stone laid in cement, and completely covered from the frost. The water is forced into this reservoir by wind-power, and is drawn by a 2½-inch main to the buildings, and distributed through them by 1½ and 1-inch pipes, laid 5 feet under ground.

The wagon-house has a self-supporting roof, and the entire front is composed of sliding doors. Carriage-houses and straw-sheds are ordinary frames. All the yards are graded and graveled in such a manner that they are perfectly free from mud at all times of the year.

The arrangement of the yards can be seen from the diagram. All the manure, except from barn No. 1, goes to the elevated track indicated, and in winter is dumped into wagons and hauled out. The total length of front shown in the diagram is 600 feet.

**Cattle Barn.**—The following is a description by Prof. Beal of the cattle barn on the grounds of the State Agricultural College, at Lansing, Michigan: It is a side-hill barn, 40 by 60 feet, with the end to the south, at which are double doors, and on each side of these, near the corners, are 4-foot doors for the passage of the cattle. The central alley is 12 feet wide, the floor of which, and that of the stalls on each side, are all tarred and placed upon a grout bottom, so that there can be no rat-holes beneath. The stalls for the cattle extend along on each side of this central alley. The earth being banked against the outer walls of the apartment for roots, prevents freezing; and the room for mixing the feed is partly protected in the same way.

The planks forming the mangers next the cattle are movable, so that by taking them out and dropping them into grooves for the purpose, the space between the mangers and the manure-gutters may be increased or diminished according to the size of the cattle. The planks forming the sides of the manger next the alley should be slanting or wider at the top, to make it easier to put in the feed, as well as to prevent the cattle from scattering the food over into the alley. The cattle are fastened with a chain about the neck, with the other end attached to a vertical rod at the side of each stall. As the ring moves freely up and down, ample room is given to the animals. In the rear are low windows. Over the passage at the rear are two ventilators, 3 feet square, reaching the roof. The roots are conveyed through side windows into the root-room. Here is a root-pulping machine, driven by a tread-power above.

The stalls vary in width from  $3\frac{1}{2}$  to 4 feet. From the edge of the manure-trough to the end of the stall next the alley is  $7\frac{1}{2}$  feet for large cows, and 6 feet 7 inches for small ones, with intermediate dimensions as required. The slanting planks dividing the stalls and alley are movable, and drop into grooves at different distances, so that the stalls may be made long or short at pleasure, with similar ones for mangers. The mangers are 2 feet wide inside. The manure-gutters are 20 inches wide, and about 5 inches deep. The manure is wheeled out with a wheelbarrow. The passage at the rear of the stalls is  $3\frac{1}{2}$  feet wide. The basement walls are 2 feet 9 inches thick at bottom, tapering upwards on the inside to 15 inches at the top.

On the floor above is a cutting machine, and stalks, straw, etc., are cut by horse-power, and run down a spout, after cutting, into the feed-room. This cut feed is then placed in thin alternating layers with the pulped turnips. A car or large wheelbarrow is loaded with feed from the feed-room, and run out in front of the stalls.

The granaries are made mouse-tight. The number of bushels held by each is marked by figures on the back side of the bin, at a black perpendicular mark. Over the granary is storage. The barn is vertically boarded, with boards a foot wide and 3-inch battens. The granaries or bins are lined with hard wood. The best way to exclude rats and mice is to pack a space with small fragments of tin—they will not work in it.

**Sheep Barn.** — The sheep barn at the State Agricultural College of Michigan—which is in many respects a good model for this kind of farm building,—is described as follows: This barn is 40 by 90 feet, and runs north and south. An alley 7 feet wide runs lengthwise through the center. It has a good floor  $2\frac{1}{2}$  feet higher than the pens on each side. At each end of this alley is a sort of step-ladder to go to the hay-loft above. The joists over the alleys are about 7 feet above it. At one corner of the chamber is a wool-room; and at the other a grain-bin. The breadth given to the alley makes it convenient for feeding, and no hay gets on the sheep. In late spring this barn is found a convenient place for young calves.

The floor over the pens and alley is all on the same level. Doors are placed in the sides of the building, opening into the loft, through which to pitch hay. The gates open for the admission of wagon and team for manure, and other purposes.

Each pen has a low door entering from the alley; and also a door running into the adjoining pen. The sheep-rack forms the boundary of the pens. Water is supplied to each pen from a pipe below ground, and which is pumped up by a wind-mill at some distance from the barn. The water is kept at a uniform level by means of a valve arranged in the reservoir. The back door passing into the yard from each pen is in two parts. The lower door is set in a groove at one edge, and is held to the other with a button. When not in use it is lifted out and set one side. The upper part of the door slides back on rollers above, and is on the outside of the barn. The upper one, when closed, permits a sheep to walk under it; or the lower one may be closed and the upper open when occupied by lambs.

The pens are 12 by 16 feet, and the yards outside and adjoining, are each 12 by 25 feet.

The pens may be easily varied in width by moving the sheep-rack which divides them. To assist in readily supplying feed from the alley, a slanting board or door inclines towards the alley, and on this the hay or grain is placed on its way to the feeding-trough below. These slanting doors are 2½ feet high, and are held in place by long hooks at the top. In the summer, these doors are set up vertically against the studs (which form the division between the pens and alley), and are held there by buttons.

**Stables.**—It is always well to have plenty of stable room, even in a warm climate, where protection from the weather is not as necessary as in the higher latitudes. Animals that are stabled a portion of the time are more tame and gentle, hence more easily managed, and are really more valuable on this account. They can also be kept in better condition by the care they may thus receive, while they will not waste one-half the food that they would if fed upon the ground. Animals that are fed on the ground will not only waste a great deal, but are liable to be injured by being hooked by others, while the master spirits of the herd prevent the timid ones from getting their portion. By stable-feeding, these evils are all avoided. Stables should be so arranged as to avoid crowding. Animals that are crowded into narrow quarters will not thrive.

Stables should, as a general rule, be built higher than they commonly are. They should never be less than eight and a half feet, while ten feet would be much better. A better and dryer condition of atmosphere is thus secured. The atmosphere of any stable should be sufficiently dry to permit the insensible perspiration to pass off, and, at the same time, sufficiently warm to dry a horse readily when its coat is wet with perspiration, and is being well rubbed.

**Light in Stables.**—Stables should be located in the sunny side of the building, that the animals may have the benefit of the warmth and sunlight thus afforded. A dark stable should always be avoided. Light is as essential to animals as to men, and no animal will thrive to be excluded from it for any length of time. At the same time, the arrangement of the stable should be such that the light can be admitted without its being too intense in the face of the animals. We have known horses and cattle to have been made partially or wholly blind by being confined in stables where the eyes were exposed to a strong light most of the time. If practicable, the light should come in from the rear, thus affording a protection to the eyes. Stables located on the south side of a building—which is the most desirable arrangement—will admit of the best means of thus adjusting the light.

**Ventilation of Stables.**—Good ventilation is also highly essential. So much has been previously stated with reference to this subject, that a repetition here seems unnecessary. No animal can be healthy without pure air. Good ventilators should be arranged at the top of every barn where stock are kept, to permit the foul air to escape, while there should also be openings near the floor for admitting the pure air. Great care should be exercised in order to have the arrangements for ventilation such that no animal shall be exposed to a draught of air. Such exposure will produce the most serious results to mankind or animals, pneumonia and other diseases being frequently occasioned by it.

We have in mind a farmer who lost, with lung fever, a valuable Alderney cow from his dairy herd for three winters in succession, from having them stand in the stable directly in front of an open window, where they were constantly exposed to a draft of air from the rear. And this farmer was either so indifferent or ignorant, with respect to sanitary laws, that it was only the fact of the cows that died in this manner having each occupied the same place in the stable that aroused his mind to investigate as to the cause.

Stables should be built tight and warm, for the comfort of the stock as well as for economic reasons, while the pure air to be supplied for the animals to breathe should find an entrance in its proper place, and not through the cracks of the barn at the sides, or up

through the stable floor, or through an open window, in cold, wintry weather, where the air is constantly blowing upon the animals. If any farmer doubts the soundness of our position in this respect, let him imagine or experience the discomfort and effects upon the health of being himself confined to a limited space, from which he could not get free, and be obliged to remain constantly in a draft of cold air day and night. If those having charge of animals were themselves obliged to be subjected, for a short time even, to the same treatment they impose upon the dumb, patient, and so often abused creatures under their care, there would soon be a great reformation in this respect, and more kindness and consideration be shown them, than we now often see.

**Floors, Box-Stalls, etc.**—The floors of stables should be strong and well laid. Serious loss sometimes occurs from the giving way of the stable floor. There should be a few box-stalls in every barn where stock are kept, and these should be so arranged that a single animal may be turned in loose when desired. These are very convenient for horses, or sick animals, to occupy. They are also almost a necessity for use as lying-in stalls for cows, while they furnish a convenient place for young calves when separated from the mother.

Whatever the method of fastening employed, it should be such as will admit of the free use of the head and a restful position in lying down. We have seen animals so tied in the stable that they could not lie down without great discomfort. While cattle should be so secured by fastenings that they cannot hook or otherwise injure each other, they should have sufficient freedom to maintain comfortable positions in standing or lying down. All animals would be more comfortable, when stabled, if they could each have the freedom of a box-stall, without being tied at all. This would be impracticable where many cattle are kept, but if all working horses could be favored with such comfortable quarters, we believe they would last much longer, and the benefits derived would well repay the expense of this luxury to them.

Freedom of movement is just as essential to animals as to man, for health and comfort, and if horses could each have a large box-stall, where they could run loose and get some exercise in unfavorable weather, and lie down in any position they might choose, it would be much better for them than the common custom of fastening them to one place in a narrow, dingy stable. Mangers should be made perfectly smooth inside, and so well fitted that even dry meal or bran can be fed in them without waste. Where racks are used, a shallow box should be arranged underneath, to prevent the waste of hay.

**Manure Gutters in Stables.**—In order to prevent the waste of liquid manure, the stable floors should be water-tight, and provided with gutters for conducting it to a place of deposit, or sufficient dry material be supplied in the stable to absorb it. Gutters for both liquid and solid manure are sometimes made in the rear of stables, into which the manure is thrown. These are cleaned out every three or four days, and the manure carted directly upon the soil, or put under a shed, or into a compost pile. These gutters are made in various ways, and of different dimensions. A Western farmer describes, in one of the leading agricultural journals, one which he has constructed as being, when finished, about eight inches deep by twenty-four in width, and costing at the rate of two dollars per cow for material and labor. It is made principally of white oak plank, and double throughout, except at the bottom, which has three thicknesses. The gutter is made perfectly water-tight by fitting the boards nicely, and applying a coat of boiling tar between the courses, care being used in putting on the second course to break the joints in the first. It is, of course, necessary in using tar in this manner to nail down the boards while the tar is hot and soft. The same writer says, respecting this method:—

“After the gutter was done, we laid one course of floor, for which we also used one inch

thick pine boards, and coated it with tar about half way up to the stanchions, and then laid the other course, breaking joints. Always use the tar hot, and use it freely, and you will find it easy to make a tight job. How long it will last I cannot say, but that it will last long enough to pay many times over, I know from experience. Being built on the ground, separate from the rest of the building, it can easily be replaced when it rots out. It takes about one barrel of tar to 75 feet of stable. Get all the cross-boards and floor-boards sawed at the mill, of the right lengths.

The manure from this gutter is wheeled out once in three or four days. By this plan a man wheels out three days' manure from 50 cows in half a day. If it was wheeled out every day, it would spoil three half-days. The stables are divided so that only 10 or 15 cows are let out at once, and while they are drinking in the yard I wheel out the manure, then put them back and let out another lot. I am keeping 15 three-year old steers on such a floor as I have described."

A farmer in Syracuse, N. Y., describes, in the same journal, a manure-gutter of very different construction, it being covered with a heavy iron grating, which permits the manure to fall through into the gutter beneath. It is as follows:—

"The joists are framed into the sill to hold it in its place. The floor is of 1 or 1½-inch hemlock lumber, laid lengthwise of the stable in two thicknesses, and so as to break joints, to make it tight. The top of the floor is even with the top of the sill. The iron floor is an invention of E. W. Stewart of Lake View, Erie county, N. Y., and costs \$6 for each cow. This is hung to the sill, so as to be conveniently raised up to allow the pit to be cleaned. I purchased and put in the floor about the middle of December, having some doubts as to its utility on account of the cows having to stand upon it with their hind feet. I have used it ever since, and I have never tried any experiment which has given me as full satisfaction (except the silo, and that no better) as this. I have not had one-half pound of manure adhering to eight cows in the whole three months, nor has it required one pound of straw or other bedding, and I do not think that I could keep the cows clean with bedding, as it would prevent the droppings from going through into the pit, and the cows would lie down in it.

I use the pit by putting into it about two or three inches deep of swamp muck (not pond mud), and once or twice each day add a little to this by throwing from a pile of muck in the stable a shovelful or two behind each cow on the top of this iron grating, and let it sift down through and mix with the droppings and the urine, and I use also daily a little plaster in the same way. If the cows do not tread all the droppings through, we brush over the top of the grating with a common stable broom (or fork), to break up the droppings and let them go through. Once or twice in a week we drive (or back in) the wagon behind the cows and load into the wagon the contents of the pit (all fine, without straw), carting it directly to the field, and spreading it where it is wanted. I am satisfied, from the little experience which I have had, that besides having something which will last a lifetime, I shall save in labor more than the extra expense every two years, and that the cows will stand or lie down upon it more comfortably than upon a common stable floor, which is not too wide to allow the droppings to fall into the gutter. Another advantage is, that I have no wood coming in contact with the urine to be saturated with it and give off a bad odor. This, and the clean condition of the cows, I consider no small advantage to a cow stable. If I had neither swamp muck nor thoroughly decomposed straw, chaff, weeds, or other vegetable matter for an absorbent, I believe I should use dry road dust. This, however, has little to do with the arrangement of a stable."

The gutter above described is 2 feet deep and 3 feet wide, the sides and bottom being of concrete. The stable floor, from the base of manger to the iron grating, measures 3 feet and 4 inches. By the use of such gutters, as above described, the objections urged against barn

cellars for the storage of manure are in a great measure obviated, since the manure is taken out before fermentation commences. Gutters for saving the liquid manure separate from the solid, when desired, are shown in previous description and illustrations of horse and cow stables.

**Barn Cellars.**—Various opinions are entertained with reference to the use of barn cellars for the storage of manure. A few years ago cellars for this purpose were much in favor, but at present many grave objections are being urged against them from some authorities, while others are as strongly as ever in favor of them.

That a barn cellar may be very convenient for many purposes cannot be denied, among which is the storage and manufacture of manure. But in their use for this purpose, unless great care is taken, and the building supplied with a most complete and thorough system of ventilation, they will become the source of disease by the contamination of the atmosphere which the stabled animals must of necessity breathe.

The fumes of decomposing manure in a barn cellar will be sure to find their way to the stable above, where the animals are kept, which will poison their blood and be a source of ill-health, while the quality of the hay and other fodder stored away in such a building will be greatly injured by this means.

Absorbents will prevent decomposition in a measure, but not wholly, even when used in large quantities, while the ordinary facilities for ventilation will prove only partially effectual. But the decomposition of the manure is one of the advantages claimed in the use of the cellar for its storage, and unless this is accomplished, one of the objects sought in their use is not attained.

Wherever so used, great care should be taken to have on hand at all times an abundant supply of dry, absorbing material, which should be employed freely, and especial pains taken to have the building thoroughly ventilated. It is also well to make use of deodorizers occasionally to prevent, as far as possible, the evil effects that may result from the storage of such a quantity of fermenting material directly under the building where animals are stabled, and fodder stored. Barn cellars furnish a very convenient place for the storage of roots for feeding stock, where they will also be beyond the reach of the frost. Such places of storage should not be directly under a stable, but under the portion of the building where hay and grain are kept.

Animals should never be stabled in a cellar. Such places are damp and unhealthy, and are injurious to animals that are confined in them. A side-hill or bank-barn may be so constructed as to have a basement on a sunny side of the building, the floor being on a level with the ground, and be less objectionable for stabling cattle than cellar stables, as sometimes arranged; but even then such stables will be more or less damp and unhealthy, and we would not recommend them for that purpose. The practice of confining swine in barn cellars where manure is stored is open to serious objections. No animal thus kept is fit to become food for mankind. It is very true that swine may thus be able to work over the manure and aid in its thorough mixing, and will eat much of the food wasted by the horses and other stock that may be mixed with it; but no animal can be healthy when forced to live in this manure and breathe such vitiated atmosphere. The "Massachusetts Ploughman" contains the following sensible advice with reference to this subject:—

"It is a fact that is conceded by every intelligent individual, that animals of all kinds, to be healthy, must have plenty of pure air and sunshine. If this be so, then what must be the condition of swine kept in a cellar where no draft of pure air can pass through; where but little sunshine can penetrate, and where the continual decomposition of animal manure is filling the air with carbonic acid and ammonia. To suppose that any animal, except of a low order of existence, can be kept in health in such a position, for any great length of time, is to

suppose an impossibility. It is true, pigs are able to live and grow in such places until they are large enough to kill, but it must be remembered that most of them are killed before they are a year old, not giving time for the disease, caused by ill-ventilation and darkness, to mature sufficiently to cause death, but it will generally mature enough to make the animal unhealthy, and thus render the pork an undesirable food.

The farmer loses in more than one direction by keeping his animals in an unhealthy place. In the first place, he loses by not getting as much flesh for a bushel of meal, and in the second place, he loses by feeding his family on the flesh of unhealthy animals. It may not create immediate sickness, but the constant eating of unhealthy food undermines and breaks down the most robust constitution, and renders it a mere wreck, often without the cause being suspected.

The farmer should ever keep in mind the fact, that, if he would keep his family healthy, he must keep the animals, the flesh of which they are to eat, in a healthy, thriving condition, and he should also remember that he can do this only by giving them good food, and keeping them where they can have plenty of pure air and bright sunshine."

It is no wonder that mankind are subject to so many diseases, when the first principles of sanitary laws with respect to the food we eat, the water we drink, and the air we breathe, are so utterly disregarded.

**Doors, Scaffolds, etc.**—The doors of the main floor of the barn should be wide and high. Narrow or low doors will prove a great inconvenience, and should never be made in any building, especially a barn. Sliding doors set on rollers are generally preferred to hinges. Where the latter are used, the hinges should be strong, and hooks arranged to fasten them open when desired. Stable-doors should also be of good size.

Means should be provided for safely locking all the barn-doors, in order to keep out intruders. Windows can scarcely be too numerous in a barn. Light is essential to the health and comfort of animals, as well as mankind; besides, it is much more convenient to have sufficient light in the barn while performing the necessary work there. Good stairs leading to the scaffolds are much more desirable than the ladders commonly used by farmers. These can frequently be so arranged as to be fastened up out of the way when desired, as in the barn first described in this department. A portable step-ladder will also prove a great convenience for occasional use.

All the bays should have tight floors, and be elevated at least from two to three feet from the ground. The loose floors of scaffolds so commonly seen in barns are very objectionable, as the hay-seed and dust are liable to sift down into the stables. In order to obviate this difficulty, the floors of the scaffolds that are over the stables should be lined and made perfectly tight. For the safety of the crops, comfort of the animals, and the prevention of injury to the building, the roof should be kept in good repair, and all leakage prevented. The walls under the barn should be made tight in the main, but there should be openings left for ventilation on opposite sides. The main floor should be smooth and well laid, and the floors of the stables made of heavy plank, and of the most substantial character.

Eave troughs should be provided for the barn and adjoining sheds, in order to prevent the large quantity of water that falls upon the roof from washing into the yard. By this method a supply of water could be furnished for the stock, if no better means of watering were provided. Lightning-rods are also a great protection. Some arrangement should be made for protecting the manure from being washed by the rains, and evaporated by the heat of the sun, when not stored in cellars, or carted directly from the stables on to the land. The barn-yards should be so located that the drainage from them will flow upon the farm lands, and also so as to receive water from no other source. It is a good plan to make them a little lower in the center than at the outer limits, in the form of a shallow dish. By this means, the drainage is retained, which may be absorbed by the use of loam or dry muck, and add

materially to the amount of fertilizers for farm use. If the soil is sandy, and therefore leachy, it should be covered with clay to prevent the escape of the liquid manure by leaching into the subsoil. Some farmers have been at the expense of making a concrete basin of their barn-yards, thus making a complete reservoir for all the fertilizing substances that are contained within it, and from which none can escape but by evaporation.

**Granary.**—Instead of a separate building for the storage of grain, many farmers devote a portion of the barn to this purpose, or the upper part of some of the other out-buildings, where a series of bins are made to substitute a granary. It is far better, however, to have a separate building for such use,—one built with special reference to the protection of grain from rats, mice, and other vermin. It may not necessarily be a very large or elaborately-built structure. The size and style of its construction will depend upon the size and requirements of the farm, but whether large or small, it should be so arranged as to prevent the entrance of rats and mice, and for the admission of air for keeping the grain dry.

A granary should be set up from three to four feet from the ground, on a perfectly smooth brick wall, or on stone posts. This is to prevent the entrance of rats and mice. In olden times, it was customary to use posts on which the building was elevated, that were capped with large, flat, smooth stones. Although such an arrangement is more useful than *ornamental*, since it proves an effectual means of securing the object sought, yet if the stone posts or brick wall, as before mentioned, are made as smooth as possible, they will subserve the purpose equally well, and look very much better.

Where brick walls are employed, spaces must be left open sufficient for a free circulation of air under the building. In order to admit of a free circulation of air in the building, two sides of it should be covered with slats from two and a half to four inches wide, placed about half an inch apart. The other sides should be boarded tight. The eaves should project considerably, and the entire building be kept in good repair, that there may be no leakages from roof or sides. There should be a passage-way through the center of the building, and doors at each end. The doors should be provided with locks for the purpose of security when desired. There should be a sufficient number of windows to render the building conveniently light. It should also be provided with a good ventilator in the roof. The bins can be arranged according to convenience. It is well, however, to locate the bins for holding ears of corn against the sides of the building, covered with slats, while those for wheat, oats, shelled corn, and meal, should be placed against the sides that are boarded, as a preventive against dampness. Each bin should be provided with a well-fitting cover, and also a lock and key.

Every bin should also have its capacity in bushels plainly marked upon it. It is a good plan to have the number of bushels which each bin contains marked on a slate or blackboard attached to it. An arrangement for this purpose may be painted on each bin at the time of completing the building. By this means the amount it contains can be recorded, as well as the amount taken out from time to time, and by deducting the sum of the latter number of bushels from the former, the amount on hand can at any time be definitely ascertained. The bins should be divided into several compartments by partitions, each holding from ten to forty bushels, or more, of grain.

Scaffolds in the upper part of the building, and which may be reached by stairs, will be found convenient for various purposes. A good step-ladder will also be necessary for use in the granary. The grain should always be perfectly dry and clean when put into the bins, and with the proper provision for ventilation and protection against dampness, as previously indicated, it can be kept in the best condition.

**Hog-House.**—In the breeding and rearing of swine, buildings will be necessary in which provision is made for warmth in cold weather, and a protection against the hot sun in

summer: for, although natives of a warm climate, and provided by nature with a protection against the cold of only a thin covering of coarse hair, they are not fond of excessive heat, and will seek shelter from the hot sun when it is accessible.

Ample facilities for ventilation should also be provided, as well as those for keeping the building in as clean a condition as practicable. Over-crowding should also be avoided where a large number of swine are kept.

The size of the building will of course depend upon the number to be kept. Extensive breeding and rearing of swine necessitates convenient buildings of large size, consisting of various departments suited to the purpose, such as an apartment for cooking their food, for fattening, and sleeping, and for keeping different portions of the herd that it is desired to keep separate from others. For fattening in the autumn, a large pasture for them to run in during the day, and a dry yard with simply a shelter at night, is what are frequently provided in the Western States; but, even under such circumstances, convenient buildings will be necessary for such as are kept over during the winter. Where only a small number are kept, it will be necessary to divide the building into two or more apartments, which are connected with each other by a door, and each connected with the yard. The partitions between the different departments should be sufficiently high to prevent the pigs from jumping over. In front of the pens there should be a wide alley.

A very convenient plan is to hang the lower boards of the partition between the pen and alley, where the feeding-troughs are, on hinges, so that they may be made to swing into the pen and leave the trough in the alley when the food is put in. This renders it more convenient in feeding the pigs, as well as in cleaning out the troughs.

An apartment for sleeping should be separated from the feeding room, and plenty of clean straw provided for their beds. The floors should be of heavy planks, well fastened down, and laid to slant slightly in the direction of the yard, for the purpose of keeping it well drained and dry. A scaffolding overhead will be found convenient for various purposes. Unless swine are permitted free access to the yard, or have fresh earth, charcoal, &c., provided them frequently, they will be uneasy, and will be liable to root up the floor, if possible, to get at the earth.

Special provision should be made for readily cleaning out the pens. The pens should be cleaned out every day, the same as stables, and if properly arranged, it can be done with but slight trouble, and in a comparatively very short time. There is no reason why pigs should not be kept in as clean a condition as other animals, if properly cared for.

Pigs should also, at all times, have access to fresh water, and the pens should be at a convenient distance from a pump, where such supply is not provided in the building. Pigs will thrive better, and be healthier, to have a sufficient amount of room and fresh air.

In raising pigs, more room will be required than simply fattening them. In a cold climate, the sow-pen should be provided with a stove, and other conveniences. Many young pigs are lost in severe weather by getting chilled, and if some means of rendering the pen comfortably warm were provided, it would amply repay for the trouble, where the farmer pays considerable attention to this industry. Harris says with reference to such pens:—

“In pens for breeding sows, we have found it very convenient in cold weather to have a partition between the sleeping and feeding apartments, with a sliding door, that can be easily closed. It is desirable, when pigs are to be made ready for the butcher in eight or nine months, that the sow should farrow early in March; and it often happens that this interesting event occurs during a severe snow-storm. With a warm sleeping apartment, and with a door that can be closed at night, or at any time after the sow has been fed, thousands of pigs that are now lost might be saved. This plan is particularly essential where the feeding apartment is partially or wholly uncovered. But even where both apartments are covered, it is better to have a partition that can be opened in warm weather, and closed during cold storms.

The only objection to this plan is, that the sow has not so much room, and there may be increased danger of her crushing the pigs against the sides of the pen. This objection, however, is more apparent than real, from the fact, that no matter how large the pen is, the sow is almost certain to make her bed near one of the sides. She almost invariably, in pigging, places her *back* against the rail or side of the pen, the object probably being to prevent the little pigs from getting on the wrong side of her, where they would, in cold weather, be likely to perish before they find the teats. Our breeding-pens have a rail on the inside, about six inches from the sides of the pen, and about one foot high, but the sows before pigging take special pains to fill the space with straw, and we are satisfied that if they did not, the little pigs, when born during a cold night, would often get on the backside of the sow, and be chilled to death."

A building for pigs may be made comfortable and convenient, and yet need not necessarily be expensive. Good planning and ingenuity are essential to render such buildings, as well as all others, especially suited to the purpose.

**Plans for Piggeries.**—The following plans for convenient piggeries will contain valuable suggestions for those farmers who purpose to build a new one, as well as others who are to repair or otherwise improve the old one now in use.

Messrs. H. M. and W. P. Sisson, Galesburg, Illinois, who are extensive breeders of Poland-China hogs, use a breeding-pen, of which the following is a description: The building is 24 x 40, with alley, 4 feet wide, through the center; ten pens, each 8 x 10 feet—plenty of room for old sows; door to each pen, 2 x 3½ feet in size; slide window over each door, excepting two at south end, where window is in the middle of each pen. Door at south end of alley is made in two halves, in order to have upper half open for ventilation. Window over door in south gable. All cross-partitions movable. Two south pens have doors inside, which swing or open into alley, and hook together, forming a passage-way from one side to the other. When partitions are out, both sides can be used for feeding, or one side for feeding, and one for lodging. Partitions can be stowed away on scaffold overhead, and replaced when pens are wanted for sows. The building is set on stone piers, about 1½ feet high. Sills, 8 x 8 inches; joists, 2 x 8; shielding, 4 x 4; rafters, 2 x 4, 2 feet apart; roof, ¼ pitch, with two good ventilators in peak, right distance apart for appearance. Seven feet from top of sill to top of plate. Stock boards, 14 feet in length, cut in the middle, can be used for the sides; battened all around; sealed up inside with common lumber to bottom of windows; tar paper used on sides and roof; 2-inch plank for floor; shingled roof. This, we believe, comprises about all needed for the structure.

Mr. Pascal Morris, of Philadelphia, an extensive breeder of Chester Whites, uses a piggery which is susceptible of reduction or extension for a larger, or smaller number of pigs, and is intended to show what many of our practical swine-breeders most desire, viz., a cheap and convenient construction of buildings, separate and distinct from each other, thus avoiding the evils that arise from massing large numbers under one roof. It will be seen that Mr. Morris has an eye to cleanliness and pure air in his piggery, as well as the healthful influences of sunlight in his swine quarters. He also looks after the comfort and safety of his breeding-sows, as twenty-five to thirty of these, farrowing at different seasons, can be accommodated under his system of separate pens, by bringing them successively within the enclosure arranged for them. In the same way, also, an equal number of hogs can be fattened without crowding or interference with each other.

The following description explains itself: "The entrance is on the north side of the building, which fronts the south, as does also each separate pen. The main building is 32 feet long, by 12 feet wide, with an entrance gate, at each lower corner, to the yard of two first divisions. The entry, or room in the center, is 8 feet wide, allowing space for slop-barrel, feed-chest, charcoal-barrel (almost as indispensable as feed-chest), hatchway, for access

to root-cellar, underneath the whole building, and also passage-way to second story. This latter is used for storing corn in winter, and curing some varieties of seeds in summer. A wooden spout, with sliding valve, conveys feed to the chest below. The grain is hoisted to the second floor by a pulley and tackle on the outside.

The entrance to the main building is by a door in the center of the north front, the door by which grain is hoisted to the second story being directly above the latter, with a four-paned window on either side for lighting the upper story of the building.

On either side of a central passage-way are six pens, the first two pens to the right and left of the door being 12 x 12 feet each, and attached to them are 25 feet in length of yard, by 15 feet wide. All the yards are extended 3 feet wider than the building, which admits of two entrance gates at the corners.

Another division then commences, consisting of a raised platform, 6 to 8 feet wide, and extending the same width as the first pen, with a board roof over it, and also boarded up on the back, which answers the purpose of a division fence, to separate from the pen behind it. Twenty-five feet of yard are also attached to this, and the same arrangement is continued to all the six divisions. We have found, says Mr. Morris, that this board roof and wooden floor, on the north side of each pen, and fronting the south, are ample protection in cold, wet, or stormy weather. The floor is kept perfectly clean, and even the feeding-trough is not on it, on account of more or less of wet and dirt always contiguous to the trough, which freezes in winter and becomes slippery.

Each yard is used for the deposit of refuse vegetables and weeds, litter, etc., thrown in from time to time, to be consumed, or made into manure. This is conveniently loaded into a cart, passing along on the outside of each range of pens. The passage-way between each range of pens gives convenient access to the feeder for all the pens. A door also communicates from one division to the other, to make changes when necessary; and also a door or gate from each pen to the outside, so that one or more can be removed, and others introduced, without any confusion or interference from any of the other pens. The two pens under the main roof of the building, being more sheltered, are reserved for cows that may happen to calve very early in the season, or in extremely cold weather, which is always avoided if practicable. For several reasons, the boiler for cooking food is in a rough shed, adjacent to the piggery and entirely outside of it. There is, indeed, no reason why this should be necessarily a part of the piggery. The above plan is not offered as embracing much that is novel in arrangement, but as one that combines many advantages which may be comprised in the following:—

Complete separation, and easy communication between each pen, as well as to outside from each.

Avoiding close and confined air, and admitting of extension or alteration for a large or small number of pigs.

Facilities for keeping clean and receiving refuse vegetables and weeds, etc., for conversion into manure, and also for loading from each pen into a cart, passing along outside.

Cheapness. With the exception of the main building, all the rest can easily be erected by an intelligent farm hand.

Mr. J. W. Morrison of Orange county, N. Y., has for a piggery a two-story building, 26 x 40 feet on the ground, the front posts being 16 feet, while the rear posts are 14 feet high. The roof is nearly flat, and covered with gravel and tar.

On the long, forty-foot side of the ground floor are five pens, each 8 x 14 feet in size, connected with which are yards 8 x 16 feet in size, these being on the south side of the building, which fronts the north. On the north side of these five pens are feeding-troughs, 1 x 1½ feet, which connect with the feeding and slaughtering-room by openings suitable for pouring the swill or other feed into the troughs, aside from which the partition between the pens

and the slaughtering-room is entirely closed, the latter being 40 x 12 feet in size. The entrance door to the feeding and slaughtering-room is on the west side, near the northwest corner of the building. This room contains the usual conveniences and implements for feeding and slaughtering pigs, such as furnace and boilers, scalding-tub, and dressing-table—the boilers being used in cooking food, or heating water for use in dressing the pigs. A door opens from the pens into the slaughter-floor, and the pens are all connected by doors between them.

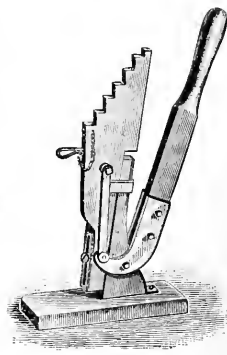
Feed-tubs are so located as to receive by conducting-pipes the skim and buttermilk from the dairy. The floor of the pens is composed of brick laid in cement, and slopes four inches back to the sills, which are raised that height from the floor, resting on iron pins, thus leaving a space for discharging both solid and liquid manure into the yards. The yards are also provided with a tight bottom, and walls of brick and mortar, thus preserving the manure from waste. The floor of the slaughtering-room slopes one foot in twenty-six in length, and a few inches from the side to the center. The second story contains the sleeping-rooms, 8 x 12, entrance to which is gained by inclined planes from the pens below. No difficulty was experienced in getting the pigs accustomed to climbing up to their sleeping rooms at night, and they keep them clean and dry; leaves are furnished for bedding. This economical arrangement of pens allows the keeping of about 50 hogs in a comparatively small building. The space over the slaughter-floor extends up to the roof, except that a platform runs around in front of the sleeping-pens, on a level with the second floor.

The arrangement of sleeping-pens in the second story, being similar to that of the feeding-pens below, leaves space for two large rooms that may be used for grain-bins and storage. The doors opening into the yards, and from pen to pen, are all managed by ropes and pulleys from in front of the pens. With a view to keeping out vermin, all space around the framework and behind the troughs is filled in with brick and mortar. There seem to be but two defects in the foregoing plans, that might properly be criticised; for while very explicit and minute directions are given on various points, nothing is said respecting the ventilation of this house for 50 hogs. There should be at least three large ventilating cupolas on the top of the building, beside windows and doors that may be opened or closed, as circumstances may seem to direct. There should also be arrangements made for keeping the yards from being flooded by rains, to the great saving of manure.

**Poultry-House.**—Plans and descriptions of poultry-houses will be given in connection with the poultry department (which see).

**Wagon-House, or Shed.**—A shelter for the storage of wagons and carts is essential on every farm. On small farms, the wagon-house, tool-house, and repair-shop may be combined in one building; but on large farms considerable room will be required for the wagons and carts alone. A wagon-house should be closely boarded, and kept in good repair. Like all other farm buildings, its size will depend upon the size of the farm, and the purpose to which it is to be appropriated. Care should be taken to have it sufficiently large for all practical purposes. If the upper portion of the building is finished off for other uses, the scaffold or floor above should be close and tight, to prevent the dust from falling through upon the floor below.

There should be a separate department where the best wagons and carriages are kept, while a small room leading into the latter may be finished off for the safe keeping of the harnesses, robes, etc. The door of this department should always



WAGON-JACK.

be provided with a strong lock. For the sake of convenience in getting wagons in and out of the building, the latter should be elevated but a little above the surface of the ground. Some wagon-sheds are left open in front, but it is much better to have them made tight by doors, thus keeping out the rain, snow, and dust.

The building and doors should be made sufficiently high to permit a high carriage to pass in and out without letting down the top. A low building that will not admit of this, is a perfect nuisance, as well as a small building that has not sufficient room to store all the wagons, or to get them in and out without great inconvenience. Better, by far, make the building too large than too small, and if there is a surplus of room it can be readily appropriated to other uses. A good wagon-jack is a great convenience in every building where wagons and carriages are stored.

**Wood-House.** — A convenient place for the storage of fuel is a necessity on every farm. It should be located near the kitchen, and be easy of access from that quarter. If practicable, it should be reached without going out of doors. In any case, it should be near the house. Sometimes a portion of the back part of the dwelling is finished off for this purpose. Its size should be sufficient to hold considerably more wood than would be needed by the family in one year. It should be provided with a good floor, that the wood need not be put upon the ground. There should be a loft over the wood-house, which may be reached by stairs. This will be found very convenient for the storage of many things. Such places are always available for some purpose, on any farm. The building should be tightly boarded and provided with windows sufficient to make it conveniently light. The front of the building should contain large doors, which may be made to slide on rollers, or hung on hinges. The wood should never be piled higher than can be conveniently reached while standing on the floor.

**Store-House.** — A building for the storage of various products is a great convenience on any farm, large or small, while on a large farm it is not only a convenience but a necessity. Such a structure will furnish a place for the storage, ripening, and curing of fruit in the autumn, the drying of nuts and garden seeds, the storage of roots until cold weather, and other purposes too numerous to mention. It should be located near the house, and be closely boarded, well lighted and ventilated. The door should be large, and provided with a strong lock to keep out intruders. It should be supplied with convenient bins, and room for the storage of barrels, which should always be kept clean. Shelves should always be placed against the walls. If designed for ripening pears, a dark place will be essential for this purpose; hence, a dark room, or a large dark closet with shelves against the wall, will be found essential, as pears require a dark place for ripening well.

Such a building should be built sufficiently high above the ground to prevent dampness, and the floors should be made very tight also, for the same purpose. A store-room should always be kept as cool and dry as possible. The underpinning of the building should be so constructed as to admit of a free circulation of air, which will aid greatly in preventing dampness. The size of such a building should be adapted to the size and productiveness of the farm.

**Tool-House and Repair-Shop.** — There should be a place on every farm for the storage of tools and farm machines, as well as the repairing of them. On small farms the wagon-house may serve for this purpose, in connection with the storage of carts and wagons; but on large farms, the many farm implements that are essential in conducting the business will necessitate a separate building or department for this purpose. The negligent and wasteful practice followed by some farmers of permitting the farm machines to lie in the open field exposed to the storms, year after year, is one not to be commended. Reapers, mowers, hay-tedders, plows, harrows, grain-drills, etc., are injured more by this means than by their use

on the farm, and the loss thus sustained would very soon defray the expense of providing a convenient place of shelter for all such implements.

Such a building need not be expensive, but should be built tight, to afford protection from the weather. It should be located near to or adjoining the barn, be well covered and lighted, and amply provided with large doors to render it convenient in getting machines in and out of the building. For the latter reason, it should also be built but a little above the ground. A tight floor should be laid, as it is not well to have machines stand upon the ground, since the dampness arising from the earth would cause the steel and iron portions to rust badly, as well as the wood-work to swell. A scaffold above will serve as a convenient place of storage for lighter implements, such as rakes, forks, baskets, etc. This scaffold should be reached by a pair of stairs.

One part of the building should be done off for a repair-shop. This can be separated from the former by large folding-doors. Tools are constantly needing to be repaired on even the best regulated farms, and a special place supplied with implements for this purpose is a great convenience, as well as the practice of economy; for if the farmer possesses the means of repairing his farm tools and machines himself, when they require it, he will be more liable to do it in season, before they become more badly broken or injured. The means of repairing them on the premises is also a saving of time and expense in having them taken to a machine-shop for the purpose. With a little practice, any farmer who is handy in the use of tools will soon be able to do many jobs in repairing broken or injured farm implements, that the special mechanic is generally depended upon to perform. The repair shop should contain a good work-bench, racks and shelves for the purpose of holding tools, a forge, and a lathe.

Two or three convenient horses, upon which planks or farm implements can be laid when desired in repairing, will be necessary. A good set of tools for all the common purposes of working wood and iron will complete the establishment. The repair-shop would require a stove in winter, in order to make it comfortable for working. Such a building, especially where a forge is used, should have a good, substantial chimney, built rather high above the roof. It should also be located sufficiently far from the other farm buildings to obviate all danger from sparks that might escape from the chimney; still, it should be at a convenient distance from them. It would also be well to cover the roof with tin, slate, or some other fire-proof material.

**Ice-House.**—It was formerly supposed that the construction of ice-houses was an expensive and laborious task, and the keeping of ice through the warm season was attended with many difficulties; therefore, ice was regarded as a luxury that few farmers were financially able to enjoy. But it has been found that very inexpensive structures, or their substitutes, with proper construction and management, are all that is essential for supplying an abundance of ice, which has within a few years ceased to be classed with the list of luxuries, and is now regarded as one of the necessities on every well-conducted farm. There is really no reason why every farmer's family should not be supplied with an abundance, since it can be furnished at so slight an expenditure of money and labor.

Those who have not been favored with the use of ice during the hot weather have no idea of the benefits to be derived from it, both in sickness and health, while those who have been accustomed to an abundant supply would scarcely feel that they could dispense with it for even a single season. Ice is absolutely indispensable for securing the best results in a dairy. In the city, it can always be readily obtained from those who make it their business to furnish it; but in the country no such facilities will be found; therefore, each individual farmer will be obliged to lay up a store during the winter months on his own premises for home consumption, or be deprived of it in the season of its use.

**Essentials in Building Ice-Houses.** — Various methods and plans are employed in the construction of ice-houses. Some prefer them built entirely above ground; others recommend that they be built partly, or almost entirely, under-ground. When suitably constructed, either method will answer the purpose well. As a general rule, the plan of building may be safely left to the skill of those who know what is required to secure the preservation of the ice when properly packed. When these essentials are well understood, any farmer, with the common tools and materials found on every farm, can easily construct one at but slight expense. The principal rules in building houses that will be successful in preserving ice may be briefly summarized as follows, viz.: a good non-conducting wall; perfect drainage, with air-tight foundations; ample ventilation at the top of the structure; solid ice, closely packed; sufficient protection between the packed ice and walls; storing the ice in dry, cold weather.

It is always well to construct an ice-house considerably larger than will contain what would be used during the season, as there will always be some waste, while, if the succeeding winter should be too warm to supply a good crop, enough may be left over to supply the deficiency. Besides, it costs but little more to build one of considerable size than a small one, and it is better to have an abundance of ice than to be limited in its use. A small ice-house also requires much more care in constructing than a large one, since the larger the quantity of ice stored within it, the better its temperature is preserved, and the less proportionate waste there will be from melting. A small quantity of ice stored requires very careful packing to prevent melting. Some prefer double walls packed tightly between with dry sawdust, or ground bark; others prefer single, tight board walls of one thickness, and fill in a foot of dry sawdust around on all sides between the ice and walls. This may be done to good advantage, as the ice is deposited in successive layers, and the sawdust may be filled in perhaps more compactly and perfectly, than in the space between two walls or partitions, where it would be liable to settle, or openings form from other causes. Whether double or single walls are constructed, we should recommend that sawdust be always used in packing between the ice and walls.

A hill-side is sometimes chosen for the location of an ice-house, and the gable of one end built above the surface of the ground, in which an opening is made to put in the ice. The other end of the structure in which is the entrance, is exposed, being on a level with the floor. An under-ground ice-house is sometimes made by digging a cellar under a shed or well-ventilated building, and providing means for perfect drainage. An ice-house with a small room partitioned off in such a manner that it shall have ice on two or three sides of it, is a great convenience, as furnishing a nice cool place for keeping milk, meats, butter, or fruit in warm weather. We have seen plans of one that had ice on three sides and the top, and the exposed side opening on the north side of the structure. A milk-room adjoining an ice-house, by which it is kept cool, should have double walls and windows.

**Plans for Ice-Houses.** — Various plans and methods might be given for constructing ice-houses, but our space will only admit of but two or three, which, together with previous instructions relative to the essentials in such a structure, will serve to furnish suggestions for various plans that may be made according to the requirements of circumstances.

A dry foundation with perfect drainage is essential. Where the soil is retentive of water, drainage should be provided by the use of drain-tiles or other equally effective means of securing it and conducting the water away. An ice-house 16 feet square and 10 feet high will hold 50 or more tons. The foundations may be of stone or brick; many simply lay down heavy planks or bed the sills in the earth. A stone or brick foundation will, of course, be more durable, although requiring more labor. Inside make a floor of cement, slightly concave, with an opening at the lowest point for conducting the drainage off by means of tiles. The walls may be double or single. If double, there should be a tight packing of sawdust or pulverized bark from eight to ten inches thickness between them. If single, at least

twelve inches of sawdust should be closely packed between the ice and wall. The walls, when double, are usually built with separate studding and posts, in which case the studs are joined by cross strips every few feet in order to strengthen the walls. Every precaution should be taken to render the foundation perfectly air-tight.

The drainage from the ice might be utilized in a more elaborate structure, by having it conducted to a milk-room, where it could be used for cooling the milk, or by constructing an apartment for this purpose partitioned off from the ice-house. By this means the drainage from the ice could all be utilized, and the consumption of ice economized. The building may be covered with rough unplanned clapboards, and the roof shingled. The covering should be very close and tight, to prevent the entrance of warm air. If the walls are double and filled, the doors should be the same. A small door above the large one, will be convenient for removing the ice until it is taken out down to the lower door, when the latter can be used for the purpose.

Another plan for constructing a cheap ice-house which will hold from 35 to 40 tons is given by a good authority as follows:—The sills to be bedded in the ground, 2 by 12, and the inner studs, 2 by 6, sheathed on both sides with common boards, the outside to be covered with felt paper, the space formed by sheathing to be filled as compactly as possible with dry sawdust, or tan bark. The outer studding to be 2 by 4, spiked to outside of sheathing and covered with common siding, leaving a space under frieze, and above base, of three inches. The foundation to be of porous, sandy soil, or if of soil that will not admit of the ready escape of water, to be underdrained with tile. The floor to be constructed by spreading from six to eight inches of sawdust or tan bark, and after leveling it, cover with common boards, leaving about an inch space between each for the water to escape. The plates to be the same as studs, 2 by 12, rafters 2 by 4. The roof should be shingled. Ventilators in the top of the roof 2 feet 6 inches square, to be surmounted by a small cupola with open slats. Doors double and filled with sawdust.

The full bill of lumber for the above is given as follows:—Eight pieces, 2 by 12 by 14, for sills and plates; thirty pieces, 2 by 6 by 12, for inner studs; five pieces, 2 by 6 by 12, for hip-rafters and collar-beams; thirty-eight pieces, 2 by 4 by 12, for outer studs; twenty pieces, 2 by 4 by 12, for rafters and the ventilator; 750 feet siding, 14 feet long; 2,000 feet common boards, for sheathing, floor, roof, etc.; twenty-four pieces fencing, surfaced, 12 feet long, for corner-boards, etc.; 80 yards building-paper; 3,000 common shingles.

An elaborate structure is not necessary in order to preserve a good supply of ice; one of rough boards, and so simple in its construction that any farmer can make it who is in the least skilled in the use of tools, will answer the purpose, providing the essential rules previously given for its successful construction be observed.

**How to Cut Ice.**—In cutting a small supply of ice, such as the quantity required for a farm or dairy, but few tools will be needed. These may be comprised in a cross-cut saw, with one thimble and handle removed, or an ice-saw made especially for the purpose, an ax, and an ice-pole. The latter implement has two sharp points, one projecting at the end to push the blocks of ice, and the other bent down at right angles with the pole to draw with. Where very large quantities of ice are stored, horse-markers and cutters are used. The ice to be stored should always be cut into square, even-sized blocks. These should be marked out from sixteen to twenty inches each way by means of a long line stretched across the ice to guide the saw. Unless the blocks are cut of uniform size, so that they can be packed closely without empty spaces occurring between, ice will not keep well, even in the very best ice-houses. A farmer in Michigan, Mr. N. Atwell, gives his method as follows:—

“A good cross-cut saw is the most convenient tool to use. A good pair of ice tongs is the best instrument with which to haul the cakes out of the water, and also to handle and load them. The cakes should be as large as they can be without inconvenience in handling.

I make the cakes  $21\frac{1}{2}$  by 27 inches. Twenty cakes of this size will complete one layer nine feet square. The second layer has the cakes placed crosswise of the layer below, and so on to the top. This binds the whole mass together. If the bottom layer is level, and the cakes are of uniform size with square edges, they will fit together nicely, making pounded ice between them unnecessary.

We find that it is less than a day's work for a man to saw out an abundant supply of ice for an ordinary family. During warm weather, ice will unavoidably melt from the outside of the mass, and if neglected, a vacancy is soon formed between the ice and the sawdust. It is very important that the sawdust be packed down often, thus preventing the admission of warm air. When we commence marking and sawing ice, we find it an advantage to make the headings widest where we commence to saw them. They can then be removed without binding or wedging fast."

**How to Store Ice.**—The floor of the ice-house should be covered from six to eight inches with sawdust, and the ice packed in as closely as possible, the cracks between the blocks carefully filled with broken ice, to make the entire mass perfectly solid, always, however, leaving a space between the body of ice and wall of the building all around, to be filled compactly with sawdust as the packing continues. This space may be from eight to twelve inches, the wider the better protection from the outside heat. Where the walls are constructed double and filled with sawdust or tan bark, this precaution is sometimes not taken, but we should always recommend the practice, as there is less liability of the ice melting, even in such cases. This is especially necessary where the walls are not lined, as there would then be no protection from the heat of the walls, and the ice would soon all melt. In such cases the packing of sawdust between the ice and walls should not be less than a foot in width. Care should be used that no spaces be left open for the air. When the house is well filled, cover the whole mass of ice with two or three feet of sawdust, and keep the building closed as tight as possible, except the ventilators at the top of the structure.

The ice for packing should be solid and clear, and the storing done in dry, cold weather, that the whole mass may become thoroughly congealed and perfectly solid. It is well to have a refrigerator, or other means of preserving large pieces as they are taken out of the ice-house, in order to obviate the necessity of admitting the warm outside air to the interior of the building by opening it oftener than is absolutely essential. The best time for doing this is in the evening, or very early in the morning, when the air is coolest. As the ice in the building melts it will become uncovered in places, unless care is taken to keep a good supply of covering added, as it is occasionally removed. Therefore a sufficient amount of sawdust for this purpose should be kept on hand, and care taken to keep the ice well covered. As the ice is taken out from time to time, or has settled away, the sawdust should be packed down at the sides, and kept as compact as possible.

**Keeping Ice Without Ice-Houses.**—Ice may be kept very successfully without an ice-house, where only a small quantity is needed. A small room may be done off in a wagon-house, or other building, or in a clean basement in the barn, where ice may be stored by having a sufficient amount of suitable covering. A large bin with double walls, filled with sawdust or tan bark, and a few holes in the bottom to admit of drainage, will answer the purpose very well. But it must be remembered that in packing the ice under such circumstances the same rules should be observed as in packing in ice-houses, except more outside covering will be required to exclude the air. For this purpose straw and hay are used very successfully. The American Agriculturist gives the following method of stacking ice, which may prove of benefit to those who have no ice-house:—

"If one has an abundance of ice, but no ice-house, and has straw in plenty, it may be worth while to stack up a lot, though it can hardly be expected to last all summer. The ice-

stack is especially useful when the ice-house is not large enough to hold a full supply, if the ice is freely used. An ice-stack, to be drawn upon during the early part of summer, will allow the store in the house to be a long time undisturbed. If the stack can be made in a shady place, all the better; select a spot where the water will drain off, and lay down a tier of rails a foot or so apart; on these put a layer of brush, and upon the brush, straw to the thickness of a foot. If possible set a strong pole in the center. Now stack up the ice as in an ice-house, taking care that the mass does not incline to one side. The covering for the sides may be straw, hay, swale hay, or even leaves, but the latter will need to be held in place by boards. A foot in thickness of protecting materials will do, but thicker will be better. Old boards, with braces to press them against the straw, etc., may be used if needed. The stack is to be finished by a roof of straw, put on with pins and ropes, as in finishing off a hay-stack. On grain farms, where straw is abundant, the mass of ice may be covered with a great thickness of straw, by building a stack of it over the ice. In using from such a stack the ice should be taken off on all sides regularly, and care taken to properly replace the covering. The larger such a stack the better. It should not be less than a cube of ice 12 feet on each side."

A cool, shady place should be chosen when the above method of stacking is practiced. Ice is sometimes stored in ice-wells in England, the ice being placed considerably below the surface of the ground. This plan is only practicable where arrangements are made for perfect drainage. The ice-house is a great improvement upon this method. Ice may be kept for a long time by storing it in the corner of some building, such as the wood-house, wagon-house, etc. A thick bed of straw should first be spread upon the floor, upon which boards are placed loosely. A layer of six or eight inches of sawdust is spread above, and the ice closely packed, to be covered on all sides with sawdust and straw. Boards will be required to hold the straw upon the ice and around it. There should be, at least, two feet of straw on all sides of the ice to preserve it from the warm air. The coldest part of the building should be chosen for this purpose, a northwest corner being the best.

**How to Keep Small Quantities of Ice in Summer.**—A refrigerator is, of course, the best arrangement for keeping food cool by the use of a small amount of ice, and it is a very useful article of household furniture for thus preserving food in warm weather, but where it is desired to keep simply a small quantity of ice for a short time, and there is no ice-house, or if it is not desirable to open the ice-house frequently, we know of no better method than the following:—

Take a clean barrel that is perfectly tight, with the exception of one or two small holes in the bottom for drainage. Have on hand a bushel or more of dry sawdust. Spread about a peck of the saw-dust in the bottom of the barrel, and then put in the large lumps of ice; the larger they are the better they will keep. Be careful not to allow the ice to come in contact with the sides of the barrel, but have a thick layer of sawdust between. Cover this with sawdust, and put in more ice as before. Cover the whole with a thick layer of sawdust pressed down tightly, and over all put a folded woolen blanket, pressed down closely to exclude the air. Ice will keep much better in this way than when only folded in a blanket. The barrel should stand in the coolest place that can be found in the cellar.

**How to Make Ice.**—The securing of a sufficient supply of ice for summer use, is usually attended with but little labor or expense to the farmer residing near a pond, river, or other body of water, from which to procure it, yet for the farmer living remote from such sources of supply, the task is a more difficult one. For the benefit of such, we quote Mr. Waring's method, which will be found both practicable, simple, and valuable:—

"Select a place on the north side of some building; lay a floor twelve feet square on scantlings, one foot from the ground. Set firmly in the ground, near each corner, two posts, from four to six inches square, and about eight or ten feet long. When the weather becomes

cold, place on the floor sawdust, tan-bark, or rye-straw, to the depth of eight or ten inches. On the top place another floor of the same size, putting a curb *inside* the posts to keep the filling between the floors in its place. Next make a curb ten feet square and six inches deep, and fasten the corners with common gate-hooks. On a cold day place the curb on the center of the floor, put in two inches of tan-bark, and dash water over the bottom until it forms a coat of ice that will not leak. Fill the curb with water and let it stand until frozen solid. With boiling water thaw the curb loose, raise it to the top of the frozen mass, fill and freeze as before. Continue so doing until the mass is of the desired height. Place boards on the *inside* of the posts, and fill the space with tan-bark or rye-straw; nail boards on the *outside* of the posts and fill the space with rye-straw; cover the top with tan-bark to the depth of ten inches. Over the whole put a roof, to shield from the sun and rain. Cut and take the ice from the top. Ice can be thus kept the entire season. If a stream of running water can be turned into the curb, the labor of filling will be much lessened."

Another method is to draw water from the well on severe cold days, and pour it into deep square tin pans or wooden boxes that will hold water. When it is frozen solid, apply hot water until the blocks of ice can be taken out, when they should be stored in an ice-house or other place for the purpose, and the pans or boxes be again filled as before. By this means, ice can be manufactured with but little trouble. This should be done in the very coldest weather.

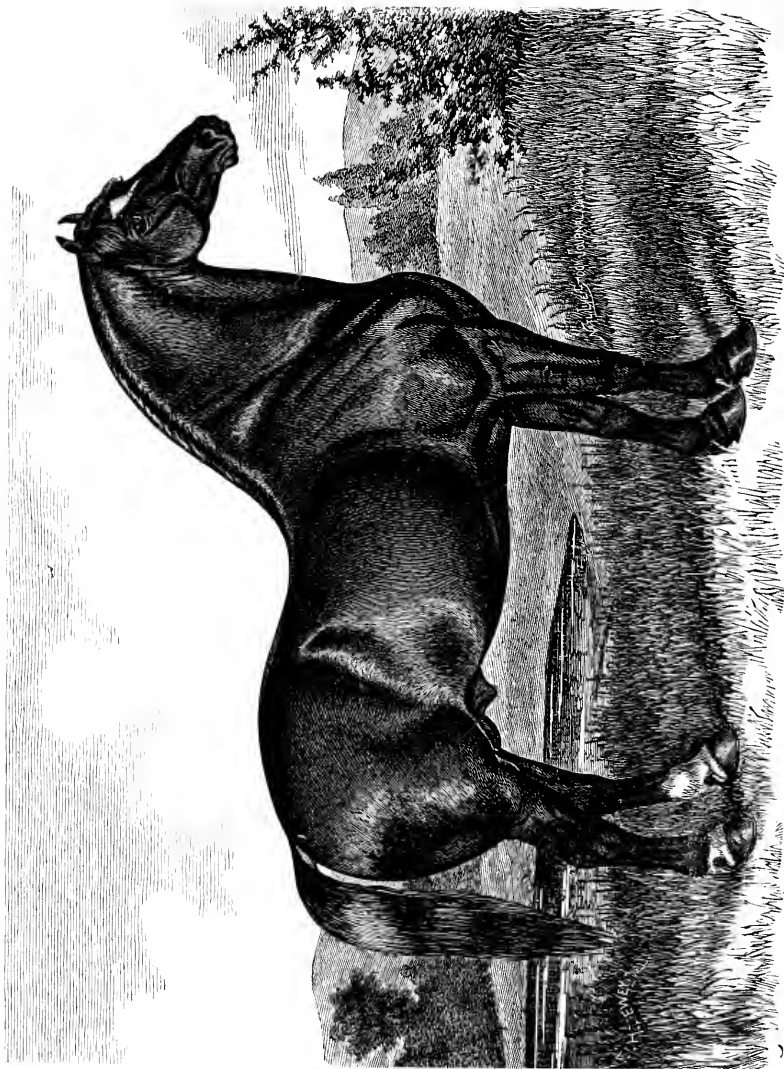
**How to Construct a Cheap Conservatory.**—Perhaps some farmers may consider directions with respect to the construction of a conservatory, scarcely admissible among those of farm buildings, such a structure not being considered an essential adjunct to the farm, and but rarely seen in connection with the farmer's house. But this does not prove that such a desirable addition to any dwelling would not be just as highly appreciated by the farmer's household, as any other, or that the attractions it might give to the farmer's home, and the happiness and refining influence it would impart, would not many times repay the slight expense of its construction.

If farmers would make farm life attractive to their sons and daughters, and prevent their leaving it for more congenial surroundings and employment in the city, they must do more than is commonly done by the average farmer in this respect. Among the adornments of a home, a simple conservatory would prove a very desirable addition.

A veranda, or a portion of one, on the south side of a dwelling, can be very easily and cheaply made into a conservatory by simply enclosing it with sashes, thus having windows for the walls exposed to the sunlight. This will convert it into a cheap conservatory with an abundance of light which can be regulated by means of shades, if desired. All that remains is to provide shelves and standards for the plants. Heat for such a conservatory can be provided by a warm-air pipe from a furnace, or by a small stove. The sun will add much to the warmth during bright days.

**Summer-Houses.**—Rustic summer-houses and arbors are very pleasant to have on the premises, and may be very easily constructed. The farmer and his boys may do much in the way of such simple home ornamentation; by spending a few days in this manner when the farm work is not pressing. It is astonishing how much can be done towards making a home pleasant and attractive, by devoting an occasional day, or a few hours now and then, to such an object. Such structures need not be elaborate, or expensive. A lattice work of rough, unplanned material, when covered with vines, will answer the purpose just as well as one of nicely finished wood. Various plans for such structures can be devised, according to the skill and taste of the owner. Painting is not essential for the preservation of the wood. A much easier and cheaper method is to thoroughly saturate all the wood-work—as soon as the structure is completed—with crude petroleum, applied with a coarse brush. Light wood-work, when thus treated, will remain perfectly sound for many years, which, if not oiled, would decay in a short time.





**PERCHERON-NORMAN STALLION, "ELDORADO."**

Prize Winner at the Michigan State Fair, 1878. Imported by M. W. Dunham, Wayne, Ill.

### PART III.

## DOMESTIC ANIMALS.

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### THE HORSE.

**T**HE history of the horse is an interesting one, and is closely connected with that of mankind, he having been in all ages of the world's record, man's willing and faithful servant, ready at all times to do his bidding—sharing his toils, hardships, and dangers. Whether on the field of battle, or aiding in the peaceful pursuits of life, he is ever faithful and true to his master.

He is also one of the most intelligent of the brute creation, second to none in this respect, —unless it be the dog,—while he is unexcelled by any of the other quadrupeds, wild or tame, in the beauty and elegance of form, and gracefulness of motion. Among the domestic animals, the horse has been the one upon which the most time, attention, and affection have been bestowed by not only the most enlightened, but barbarous races also, and it is quite safe to assert that more money and intelligent effort have been expended in attempting to improve and perpetuate the distinguishing traits of the best breeds of this animal, than upon all the other domestic animals combined.

The affection which the wild Arab entertains for his horse, is an interesting feature of that barbarous race, and serves to counteract, in a measure, the undesirable characteristics, or, rather, causes us to regard them with more leniency. A human heart with a love for *something*, cannot be wholly depraved.

The horse, ass, zebra, quagga, and a few other similar animals, belong to the genus *Equus*. This term denotes a small group of quadrupeds of the Mammalia class, which have a single hoof, as the horse, ass, etc. The different species of the genus *Equus* may produce hybrids, but these hybrids are generally sterile, as in case of the mule, which is the product of the male ass and mare, or the hinny, the product of the stallion and female ass.

Horses exist in a wild state in various portions of the globe, but they are easily domesticated, even the progeny of those that have run wild for centuries. The period of their first domestication is unknown. Horsemen and chariots are mentioned in Genesis, in connection with the history of Joseph, in transferring his father's remains from Egypt to Canaan. The horse was also in common use among the Egyptians in the time of Moses.

At the time of the exodus of the Israelites, Pharaoh had numerous war chariots drawn by horses. It is also stated that Solomon received many horses from Egypt.

The horse has been domesticated for so many ages, that his original habitat is unknown, or the manner in which he was first trained; in fact, though frequently mentioned in history, but little was known respecting him until about four hundred years before Christ. Xenophon was the first writer who left us any statement with respect to the opinion of that age as to what were the best points of a horse, or who described in detail the proper method of training him, which method—strange as it may seem—might, in the main, be regarded as a standard authority at the present time.

From what we are able to learn, the horse was but little used by the ancients, except in war and the chase, and for these purposes the wild horses of the East were well adapted. It

is, therefore, supposed that up to the commencement of the Christian era, the main characteristics of the horse had been but slightly changed by domestication, the principal changes being such as had been produced by different climates, soil, and food upon which they subsisted. Where the climate is cold and vegetation scanty, the wild horses are dwarfed in size, active and hardy, with compact bodies and long hair. The horses of Iceland, Shetland Isles, and the wild horses of the northern and central portions of Asia and Northern Europe generally, are of this type. These present a striking contrast with the high bred racers of England and the United States, the beautiful Arab, the active Barb, the powerful Clydesdales and Percheron-Normans, or the wild horses of America. The latter are known to be descended from domestic horses brought to this country from Europe by the Spaniards,—the thousands of wild horses on the plains of South America being, according to the best authority, descended from only two stallions and four mares which the early Spanish adventurers left there.

Arabian horses, as a race, have been the most celebrated, while those of Turkey and Barbary (the latter called Barbs) are quite similar. From these, by a thorough and judicious system of breeding, have sprung the English race-horse, which at the present time so far surpasses the original, that scarcely any benefit has been derived from imported stock for more than three-quarters of a century.

The Persian horse has also been quite celebrated. It is more stoutly built than the Arabian, nearly equal to the latter in speed, but possesses less endurance. The Flemish and Dutch horses are generally large, well-formed animals, with fine chests, and an abundance of bone and muscle, and well adapted for purposes of draft. The celebrated draft horses of England were principally descended from these. The French horses are particularly valuable, the Norman breed having long been noted for their excellence. The most celebrated of the Russian breeds is the Orloff.

The Chinese horses are quite inferior. Italian horses were formerly quite highly valued, but do not compare favorably with the present improved breeds of some other countries. England is the source from which the best of our horses have been derived, the thorough-bred blood of our racers being obtained from that source.

The horse is invaluable to man in all climes and conditions, but willing and faithful servant that he is, he too often suffers from ill-treatment and neglect, and is but poorly recompensed for all his fidelity. There is no animal that has proven more useful to man, and none that has been so much abused. There is also no animal that so well deserves or amply repays by his services the best treatment.

The Arabs have the following tradition respecting the origin of the horse: "When God wished to create the horse He said to the south wind, 'I wish to form a creature out of thee, be thou condensed,' and the wind was condensed. And God formed a chestnut horse, saying, 'I have called thee, horse; I have created thee an Arab, and have given thee a chestnut color. I have bound fortune on the mane which falls over thine eyes; thou shalt be chief among animals; men shall follow thee whithersoever thou goest; good for the pursuit, as for the retreat, thou shalt fly without wings; riches shall repose in thy loins, and wealth shall be made by thy intercession.' Then He marked him with the sign of glory and of happiness, a star shining in the middle of his forehead. After the creation of Adam, God called him by name, and said 'Choose now between the horse and the borak,' Adam replied, 'The more beautiful of the two is the horse.' And God said, 'Excellent, thou hast chosen thy glory, and the glory of thy sons; while they exist my blessing shall be with them, because I have not created anything that can be more dear to me than man and the horse.'"

Next to man he is one of the noblest and best of God's creations, and under proper training, and kind treatment, can be made to do everything that comes within the limitations of his powers.

Naturally generous, affectionate, and confiding, he attaches himself to his friend and master, and is ever ready, with kind and yielding disposition, to do within the limits of his capacity all that can reasonably be required of him; while all that is necessary to make him kind, amiable, and gentle, and at the same time increase his knowledge, is to recognize this capacity, and by careful education develop his mental, and (we might almost add) moral qualities, to their fullest extent. Thus domesticated and taught by intelligent owners, the horse will not only increase in intelligence, docility, and consequent value, but will reciprocate the affection bestowed upon him, as is instanced in the well-known Arab custom, where the horse is domesticated to the extent, that he is at the same time servant of the master, and playmate of his children.

**Qualities Desirable in a Horse.**—While it is essential that the horse should be adapted to the purposes for which he is to be principally used, whether for the common purposes of the farm, for a draft-horse in drawing heavy loads, the carriage, saddle, or race-course, there are certain characteristics which the animal should possess, aside from the qualities desired for special purposes. These may be included in a good disposition, a desirable temperament, strength, endurance, and activity. Beauty of form and color, gracefulness in motion, are also very desirable, although not absolutely essential for all purposes. There are many good horses that are lacking in the latter qualities, but we think it would be better to be at a little more expense in purchasing a horse, and procure one that looks well in all respects, than to be obliged to use an animal that is a constant offence to the eye and taste, even though it might be valuable as far as utility is concerned.

**A Good Disposition.**—A good disposition is highly essential in a horse, for without this the animal is almost worthless and exceedingly unsafe. Like the human race, horses differ greatly in disposition, no two being alike in this respect. Some are born naturally vicious, and many others are made so by ill-treatment.

A horse with a naturally bad disposition may, with kind treatment, become greatly changed in this respect, and yet such a horse is never really safe, for the evil of his nature may display itself at a time when least expected, and where an animal has so much within his power; it is always best to be on the safe side, which will be by never keeping a bad-tempered horse. A horse may be gentle for years; but if he does not possess a good disposition naturally, he will be liable to display his vicious temper in an unexpected moment, and therefore cannot be safely trusted. The disposition of a horse can be easily determined by even an inexperienced horseman, by the expression of the eye, shape of the head, the manner in which the animal moves his ears, his movements generally, and various other ways, any one of which, or all combined, are a pretty sure index of the temper of the animal.

**Intelligence.**—Intelligence is also equally essential. An intelligent horse can not only be made more useful, other things being equal, since he can be taught more readily, and to a greater extent, than a stupid animal, but he is generally more docile and kind in disposition, and also more safe, being less liable to be easily frightened and become unmanageable.

**Strength and Endurance.**—Strength and endurance are very indispensable qualities. A horse that possesses but little of either is not of much value for any purpose whatever, and whether as a farm, draft, or carriage horse, must necessarily be used to disadvantage. Weak teams for any use are inefficient and unprofitable. Size and strength are not always combined in a proportionate degree in a horse; neither are strength and endurance. While as a general rule a large horse will be much stronger than a small one, yet there are exceptions to this rule, and many large, heavy horses are not as strong as they seem to be. The strength of a horse, while in a measure depending upon his size, depends much more upon his form and muscular development. For this reason, we frequently see medium-sized horses that are stronger than those

that are much heavier. This is not always so, but is sometimes the case. A large horse with a good form and well-developed muscles, will be stronger, other conditions being equal, than a small or medium-sized one, with an equally well-developed form and muscles, but the size of the animal will not always prove an index of his strength. We specify thus particularly because we wish to be understood that strength does not always depend upon size. Many horses will also be very strong and able to draw heavy loads for a time, but do not possess the power of endurance that others of less strength may have. A horse may be in disposition, free and willing, and perhaps work beyond his strength, and consequently will be liable to be injured by continual severe labor, such as he is obliged to perform at certain busy seasons on the farm. Irregularity in labor and in feeding, which are frequently practiced in the busy season on most farms, are very injurious to a horse, and a great strain upon his powers of endurance. A horse, as well as a man, will be able to perform much more labor in the aggregate, with less exhaustion to the physical system, by observing regularity in labor, performing about the same amount day after day, than to do an excessive amount of work for two or three weeks, and then lie idle about the same length of time. Regularity is in accordance with Nature's law, and a violation of this law is very liable to bring evil results. Farm labor, being much more severe at some times than at others, will test the powers of endurance of a horse much more than regular labor of some other kind, and therefore the farmer should have for this purpose a horse possessing great powers of endurance in connection with the other good qualities previously mentioned.

**Activity.**—Activity is also a desirable quality in a horse, and a sluggish drone is to be avoided. For a carriage-horse this is very essential, and it is also very desirable in a farm-horse, which, with the majority of farmers, is the "general-purpose horse." A horse with a very nervous temperament, sprightly and active in movement, might prove restive and uneasy under the slow process by which much of the heavy farm work is performed. On the other hand, a sluggish horse, whose activity would not much surpass that of an ox, would prove quite as objectionable. A medium between the two would be an animal possessing a fair amount of activity, yet patient under restraint and admirably suited to all kinds of labor. There is a great difference in animals in this respect, and consequently in the amount of labor they are able to perform in a given time, therefore some horses will prove nearly twice as valuable to the farmer in this respect as others.

**The Farm Horse.**—As we have previously specified the qualities generally desirable in a horse, which qualities are especially essential in a farm horse, it will only be necessary in this connection to mention some points not referred to in the former, and which have a special application to this subject. On those farms where several horses are required to perform the work, and a special carriage-horse is kept, it is customary in some sections, especially in the Western States, to employ the heavy draft-horse for farm purposes, those showing great compactness of body and muscle, low, broad, and heavy-boned, with short neck, wide breast, and withers so formed as to throw the greatest weight into the collar. Such horses are admirably adapted for heavy work. But where the farmer is unable to keep more than one or two horses—and this comprises a large class of farmers—it is generally conceded that, for all the practical purposes of the farm, one of medium size is to be preferred. Under all circumstances, the animal should be adapted to the kind of work for which he is to be principally used. If for general use on the farm, he should neither be too heavy for the road or light work, or too light for heavy work, therefore a medium sized animal, under such circumstances, will best meet the requirements of the farmer. Hon. Geo. B. Loring, Commissioner of Agriculture, sketches in the following a pen-picture of his ideal of a farm horse:—

"When I commenced farming, I made up my mind that my horses should be as good

as my sheep and cattle; that none of them should be surpassed; and that I would find out a way to breed and rear my own, instead of going into the market to purchase the fruits of other people's industry. I knew very well what I wanted. I did not want a running-horse, nor a saddle-horse, nor a cart-horse. I wanted a horse of all work—a horse weighing a little more than ten hundred pounds, in good road condition; fifteen hands and one inch high (for I had found that this height and weight usually go together); with a head not too fine, wide between the eyes, and high above them; with a good-sized, steady, erect, and lively ear; with every bony process sharp and prominent—even the processes of the first cervical vertebra behind the ears; with a calm and well-set eye, and lips which indicate determination rather than delicacy; a Websterian head, with a neck well muscled, well arched, strong, and elastic; with active motion, and a throttle loose and open; with withers not sharp and thin, but solid and strong; with a shoulder set loosely on, broad and deep at the base; with a strong arm, sinewy leg, short cannon-bone, firm and not too long or elastic a pastern, and a firm foot; with a deep chest, without a prominent and bulging breast-bone; with a round barrel, ribbed well back toward the hips, but not so far back as to interfere with the action of the hind-quarters; with a short back, and a slight elevation of the rump just behind the coupling; with a long and strong quarter, well muscled inside and outside; with a hind-leg so set on, that the action shall be free and open, and with the fore-leg so set on, that the toes shall not turn out for fear of brushing the knees at speed, and that they shall not turn in too much for fear of paddling. I wanted a good strong bay color with black points, and a temperament calm, collected, fearless, defiant, and a brain quick to learn, and strong to remember. This was the horse I wanted, and I felt sure I could breed him."

We may add with propriety, that Dr. Loring *did* breed him successfully, and so may any farmer who understands the true principles of breeding, and conforms to them.

**The Carriage Horse.**—The English carriage-horses are generally larger than those of this country. The carriages used in England are also larger and heavier than American ones, consequently there is a great demand there for large carriage-horses of elegant style and free, rapid action. In this country we have many trotting horses, but there seems to be a scarcity of the larger carriage-horses of the English type, although there is at present an increasing demand for them. As has been stated by one of our prominent agricultural writers—

"We have as yet no distinctive breeds of driving-horses or roadsters. The horses used for light driving, fast trotting, etc., are largely a conglomeration of all breeds and types. Some approximate the French Canadian pony in form and action, while others possess most of the characteristics of the thoroughbred; but so popular has fast trotting become in this country, and so universal is the fancy for fast driving-horses, that at almost all our fairs the roadster class will be found more largely represented than any other, and usually more largely than all others combined. Indeed, the roadster is more distinctly an American feature than any other in our equine product; and we are fast approaching the time when the American trotting-horse will be classed as a distinct breed. It is the creation of an American fancy—the result of a fashion that has demanded the fastest and stoutest trotting-horses in the world for driving on the road; and to this end we have selected and bred until our horses surpass all others in this particular. Among these horses we have several recognized families of especial prominence, all more or less related, but each possessing features that are to some extent peculiarly its own, but none of them entitled to be called a breed."

A good carriage-horse should have a moderately small head, free from much flesh, thin lips, open nostril, a kindly, expressive eye, full and lustrous, a broad forehead, wide between the eyes, but not between the ears, ears rather small, finely formed, quick and playful in motion; throat broad, neck slender, well set and arching; the skin thin, hair fine and glossy; chest deep, withers high; oblique shoulder; body and limbs well formed and adapted to

strength and endurance; the hoof round, hard and smooth, wide at the heel, the frog sound and large. As we shall define more particularly in the pages that follow, the desirable points in a horse, a more minute description in this connection is unnecessary; suffice to say, that intelligence, or what might be called good horse-sense, combined with docility, is one of the most desirable characteristics in a horse for any purpose, and especially a carriage-horse.

**The Saddle Horse.**—There seems at present to be an increasing demand for good saddle-horses, and we are glad to note the fact, as there is no more healthful or pleasant recreation than is afforded by saddle-riding, when the horse is perfectly adapted to the purpose. The requisites are similar in the main to those of a carriage-horse. For such use a rather small or medium-sized horse is generally preferred. High withers are essential in a saddle-horse, to prevent the weight of the rider from being thrown forward too far.

**Saddle-Gaits.**—We quote the following on saddle gaits from one of the leading authorities in the country: "The gaits that especially commend a horse for use in the saddle are, the *walk*, the *fox-trot*, the *single-foot*, and the *rack*. The walk is a gait understood by everybody; but everybody does not understand that a good saddle-horse ought to be able to go a square walk at the rate of five miles an hour. The fox-trot is faster than the square walk, and the horse will usually take a few steps at this gait when changing from a fast walk to a trot. It may be easily taught to most horses by urging them slightly beyond their ordinary walking speed, and, when they strike the fox-trot step, holding them to it. They will soon learn to like it, and it is one of the easiest of gaits for both horse and rider.

The single-foot differs somewhat from the fox-trot, and has been described as exactly intermediate between the true trot, and the true walk. Each foot appears to move independently of the other, with a sort of pit-a-pat, one-at-a-time motion, and it is a much faster gait than the fox-trot.

The rack is very nearly allied to the true pacing-gait, the difference being that in the latter the hind foot keeps exact time with the fore foot of the same side, making it what has been called a lateral or one-side-at-a-time motion, while in the former, the hind foot touches the ground slightly in advance of the fore foot on the same side. The rack is not so fast a gait as the true pace; but it is a very desirable gait in a saddle-horse. In addition, the perfect saddle-horse should be able to trot, pace, and gallop, and should be quick, nervous, and elastic in all his motions, without a particle of dullness or sluggishness in his nature. His mouth should be sensitive, and he should respond instantly to the slightest motion of the rein in the hands of the rider. A poor and clumsy rider, however, will soon spoil the best-trained saddle-horse in the world, and such a person should never be permitted to mount a horse that is exceptionally valuable for that purpose. A "plug" horse and a "plug" rider may well go together; but keep a really good, well-trained saddle-horse for one who knows how to enjoy this most health-giving, exhilarating, and delightful of all out-door exercises."

**Points of a Horse, or Marks by Which a Good Horse May be Known.**—To be familiar with those points, or marks by which a perfect animal may be known, or, in other words, (since absolute perfection in anything is impossible,) to become acquainted with the highest standard of excellence by which to judge of a horse, is of great importance and interest to any one who is about to purchase, breed, or have the care of horses.

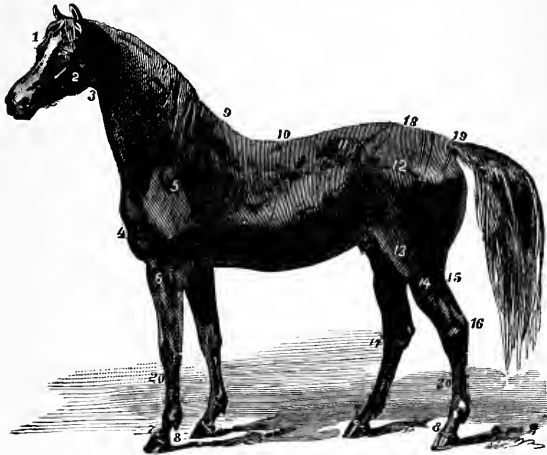
As the face of a man, and the conformation of his head, are generally a very sure index of his character, or natural propensities, it is equally true that we may determine the disposition, temperament, and intelligence of the horse by the shape of the face and head, while his strength and power of endurance may be determined by the bones, muscles, and general make-up of the body.

In the same connection, there are other considerations that should not be lost sight of,

and which are of great importance to the purchaser, whether the animal is designed for the track, carriage, farm, or draft horse, one of which is the pedigree of the animal. It is true that some very fine animals have been produced, as it were by accident, with no pedigree to which to trace their origin; but these are the rare exceptions, the general rule being, that like begets like.

Again, it is of importance to know how a horse has been raised, whether he has received kind treatment or has been ill-treated to the injury of his disposition and physical powers; what has been his principal food, etc. There are localities in the country where young horses are fed very much as swine are, while there are others in which grass, hay, and oats are the principal food of the colt, diet which tends to the production and development of the bone and muscle required for hard service, whether on the road or at the plow. The mature horse, it is true, may be fed moderately on corn without injury to the animal; but, in this connection, it should be remembered that corn and the production of beef and pork are more intimately related than corn and horse-flesh are, and that what is needed in the horse is hardihood and endurance. If to these we add *speed*, we have the American trotter; while if to these we add strength, we have the American work-horse.

The illustration above given, showing the several parts of the horse, and indicated by terms recognized by horsemen generally, will prove of value to those not already familiar with them.



- |              |                   |                |                        |
|--------------|-------------------|----------------|------------------------|
| 1. Forehead. | 6. Arm.           | 11. Loin.      | 16. Point of the Hock. |
| 2. Jaw.      | 7. Large Pastern. | 12. Hip.       | 17. Hock.              |
| 3. Throat.   | 8. Small Pastern. | 13. Stifle.    | 18. Croup or Rump.     |
| 4. Breast.   | 9. Withers.       | 14. Thigh.     | 19. Dock.              |
| 5. Shoulder. | 10. Back.         | 15. Hamstring. | 20. Cannon-Bones.      |

**Temperament.**—With animals, as with individuals, there are different temperaments. One of the most essential points to be observed concerning horses is the temperament. There should always be a distinguishing difference recognized between temperament and temper, or disposition. This difference is very aptly defined by Murray, as follows:—“The temper is an accident, the result of education, or treatment; in rare instances, of birth; but the temperament is a law or mode of being affecting and modifying the physical structure and the nervous forces. The temper can be modified or changed—the vicious can be made amiable, and the amiable vicious. Not so with the temperament; that is fixed at birth, and remains immutable, dominating over the entire organization. Diet, training, treatment in sickness—these, and much beside, are suggested to the thoughtful mind by the temperament of the horse.

I could show that this matter of temperamental organization of the horse potentially affects the entire animal—even every minute point of the physical structure, and each separate part and function of the body. If the temperament be an active, lively one, then

will the bones be fine in their texture, ivory-like, and lasting. The muscles, also, will be influenced, and become wiry, compact, and elastic as spiral wire. If the temperament, on the other hand, be sluggish, heavy, lymphatic, the bones will be spongy and porous in their structure, the muscles flaccid and coarse, and the nervous organization low, dull, and inoperant. I am well aware that size, all else being equal, is a true gauge of power; but let it never be forgotten by the breeder and purchaser of the horse, that 'all else' is not equal. Size alone is no measure of power; for all can see, even with the most casual examination of the subject, that the slightest alteration in temperament makes a corresponding alteration in the power and efficiency of every individual part.

A horse does not draw by virtue of his weight, nor in proportion to his size. The public scales and the measuring-tape can never assure us how much a horse can draw, or how many miles he can pull a wagon and its owner in a day. Muscular action and nerve-force must be considered; and these are both closely allied to, and dependent on, the temperament of the animal. The well-bred horse, inch for inch, and pound for pound, is far stronger than the dray-horse; and old 'Justin Morgan,' the founder of the most wonderful family of horses (all things being considered) this or any country ever saw, could draw logs that horses of twelve and thirteen hundred pounds could not even start, albeit he weighed only about nine hundred pounds, and stood barely fourteen and a half hands high. It is the amount of *vital* force that, at the end of a stick of timber, or on a weary day's journey on a heavy road, tells the story."

There are four distinct temperaments generally recognized, which are, however, but rarely found separate, being usually blended and mingled in a greater or less proportionate degree. They are the nervous, bilious, sanguine, and lymphatic. When not separate, one will be found to so predominate over others as to stamp its characteristic upon the animal, and be easily recognized.

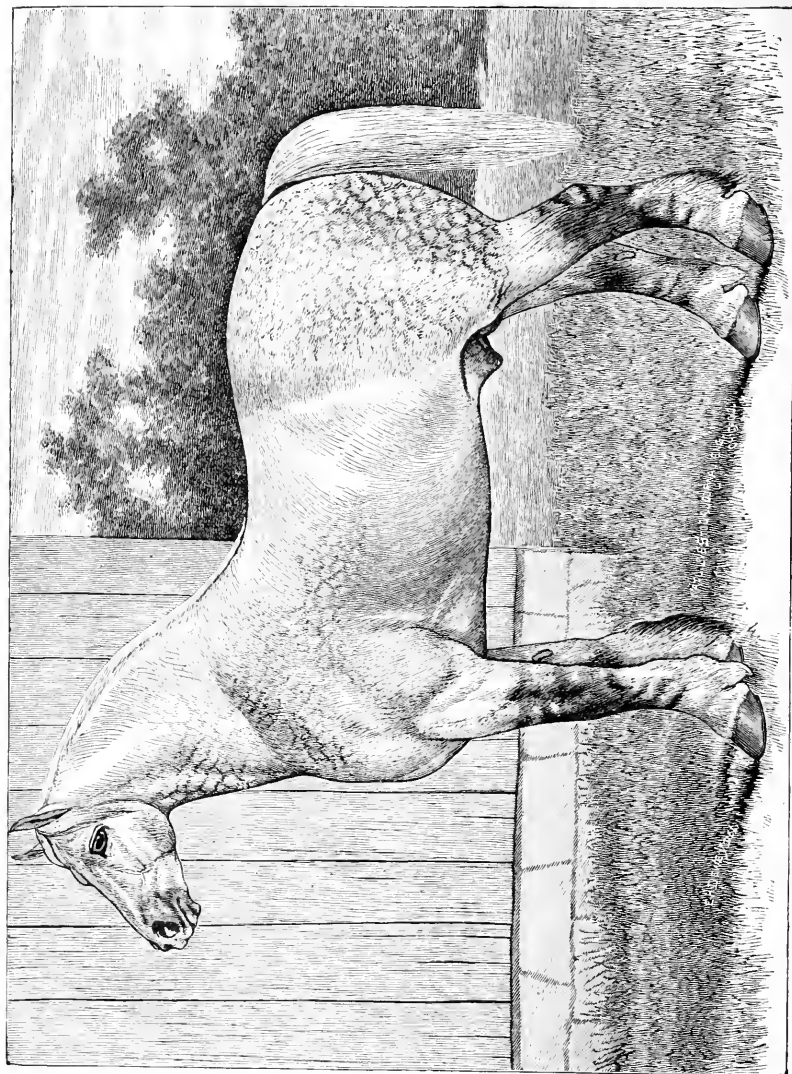
**Nervous Temperament.**—A horse with a nervous temperament will have an animated expression of face, quick-moving ears, and will be characterized by quickness in all his movements, nervous excitability, and extreme sensitiveness. Combined with these, he will have a large brain. Such a horse will chafe under restraint, like being forced to do work that requires slow movements, as plowing, for instance, and when allowed to test his strength in drawing heavy loads, or doing hard work of any kind, will be liable to over-work himself and be permanently injured. A horse of this kind will suffer extremely from harsh treatment of any kind, even harsh tones of voice, and will be liable to take fright and shy out quickly when on the road, unless the driver is on his guard. The "Vermont Black Hawk" has been instanced as one of the best types of this class of horses.

**Bilious Temperament.**—The bilious temperament is characterized by a well-developed muscular system, and a horse of this class will have large bones and muscles, and be capable of great strength and powers of endurance. Such a horse, possessing great muscular power, will be able to perform a vast amount of hard labor, without breaking down.

**Sanguine Temperament.**—Next follows in order the sanguine temperament, which is associated with a large development of the vital organs—the heart, lungs, etc. An animal possessing this temperament will be what is called "long-winded," and whatever he does will be done with ease, and but little appearance of panting or exhaustion after being driven fast. Having large and well-developed vital organs, his digestion will be exceedingly good and the food he eats will be assimilated and appetized, so that food and rest will be to him truly "nature's repair shop," and day by day he will go forth fresh for a trial of speed or strength.

**Lymphatic Temperament.**—A horse with a lymphatic temperament will be lazy and dull. He will generally be a heavy animal with a surplus of fat, and slow-moving and stumbling in his gait. Such a horse is scarcely worth the whip that drives him, and the driver will well earn the work he gets out of him.





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**The Eye.**—It has been said that the eye is the window through which we may look into the soul of a man. As this is the most expressive feature of the human face, and the one by which we can best determine the disposition of the individual, so with the horse; some of the most important characteristics of the animal may be read in his eye. If you do not like the eye of a horse, have nothing whatever to do with him, for you will not like the animal. The eye of a horse should be intelligent and kindly in expression, yet full of courage, and characterized by mildness and gentleness. It should also be rather prominent and full. The nearer the eye of a horse approaches that of the deer, in expression, the better. A horse that is frequently looking back of him furtively, so as to show the white of the eye, is generally apt to be mischievous, and is not to be trusted.

**The Ears.**—The ears of a horse, as well as the eye, may express much. They should be fine in texture, that is, thin, in which the veins are readily traced; rather small, and not too long proportionately for the head that carries them. They should be curved slightly inward at the tips, and covered with fine, short hair. They should be set rather close together at the base, quick and playful in movement. A horse that is in the habit of laying his ears back, down close to the head, is not trusty, and will be inclined to kick or bite if he gets a chance.

**The Head.**—The following extract from the description of the head of a perfect horse, by Carson, will be found to contain many excellent suggestions: "The head of every horse should be as small as would be in keeping with the rest of his body. A large, coarse head is a defect in every person's eye; and it has no advantages to counterbalance its deformity. The muzzle should be fine, and of moderate length; the mouth invariably deep for receiving and retaining the bit; and the lip rather thin and firmly compressed. A fine, tight lip is a pretty sure indication of an active temperament, and consequently affords a measure of the energy and durability of the animal. Horses with short, flabby lips, lying wide apart are proverbial for sluggishness. The nostrils should be large, so as to be capable, when open, of allowing the air to have free access to the lungs. In conformity with the uniform condition of the Creator's work, it will be found that there is a direct relation between the development of the nostrils, and the capacity of the lungs for air. Hence arises the necessity of observing the size of the nostrils. Capacious lungs would be of no use if the orifice which connects them with the external atmosphere were so concentrated that they could not get properly filled.

The race-horse must have very wide and dilatable nostrils to admit a large volume of air, with the utmost freedom and greatest speed, into his widely and rapidly distended lungs; but the horse of slow work can take more time in his breathing, and consequently does not require such a very large nostril as the racer, hunter, or steeple-chaser. Care must always be taken, recollect, not to confound a naturally well-developed nostril with one which looks large in consequence of having been kept in a state of permanent distention by disease of the lungs or air-passages.

The muzzle ought to be fine a good way up, and then the parts should enlarge suddenly, in order to give plenty of breadth to the under-jaw, as well as thickness from side to side. This is a point of great beauty, as it gives breadth to the jaw-blade, and breadth from eye to eye, whilst the fineness of the head generally is maintained. A head that is narrow between the eyes, and narrow on the side of the jaw, is painfully disagreeable to the eye of every judge. The *space* between the two blades of the under-jaw ought to be so broad and so deep as to freely admit the lower edge of the neck when the chin is reined in towards the counter; but it should not be wider than this, as it would then appear coarse. If there is sufficient room in this locality, the horse can be reined up to the proper pitch without stopping up his windpipe.

The *face*, on a side-view, should be dipped in the center between the eyes and the nose. This is generally the case in the Arabian and English blood-horse; and it is a much more beautiful formation than either the straight or convex profile. However ornamental it may be to the human face, a Roman nose certainly does not improve the appearance of the horse. The line of beauty in the one case is very different from the other. A dish-faced horse is admired on all hands; but a pug-nosed man, with a projecting, upturned chin, will have some difficulty in carrying off the prize for beauty. The face must be very broad between the eyes; but it should taper a little as it approaches the ears. If the breadth is carried all the way upwards, the top of the head will be too wide, the ears ill-set, and the horse probably sulky. Now, in respect to the head, it should also be examined in detail, for in it are distinct organs having distinct uses, and each contributing its share to the proper understanding of the animal to which they belong, and to which they serve. But, of all these organs, perhaps the eye is the most expressive and characteristic of them all.

The portion of the head lying between the eyes and the ears is worthy of the closest possible attention; for it is the section occupied by the brain itself, — the seat of all intelligence, docility, and motive-power. This section of the head can scarcely be too full. I would never breed a mare to a stallion deficient at this point of his structure. I want no colts from a sire with a flat forehead; for such a horse is a savage, sulky, detestable brute. To start with, he will have no memory: he will forget to-morrow what you taught him to-day. Even if he wished to remember it, he could not; for he is incapable. To a bad memory must be added a bad disposition. He is sour, cross, and crabbed, tricky and malignant. His cunning is not playful, but mean; and his tricks are tricks of cruelty. No one ever saw a horse, with such formation of front, tractable and trusty.

But if, on the other hand, you meet a horse with a bold, prominent forehead, a noble fullness at that point where the brain is lodged, you will find him to be of a docile and silky disposition. You can teach him anything; and, when once taught, he will rarely if ever forget. Indeed, his great intelligence suggests to his owner a caution: Never teach him to do anything that you do not desire him to do always, and at all times; for whatever he has once acquired you can only with great difficulty eradicate. I do not wish to be understood as saying that every horse with a fine brain development is gentle; for he may have been trained under a system so essentially vicious, that no natural amiability could withstand its savage friction; but this I *do* wish to be understood as saying, — that every horse with this full and fine brain development is by *nature* courageous, docile, and loving; and that, if they become otherwise, it is owing to the vicious management of those who have them in charge."

**The Neck.**—The neck should be suited to the animal. A neck desirable for the trotter, would be entirely unsuited to the draft horse, and the reverse. The neck should vary according to the service for which the animal is designed. For speed, the nearer the neck approaches the greyhound type, the better, provided it admits of sufficient room for food and air. If, however, the length and lightness of the neck be carried to extreme in breeding, there will be danger of constitutional weakness as a result.

For draft horses, a heavy, thick neck, where it enters the shoulder, is very essential. Much of the beauty and elegance of style in a horse depends upon the form of the neck. It is much more easy to the hand in driving a horse with a long neck, than a short one. Many horses have their necks spoiled by the improper use of the check-rein in producing too much of a curvature, or in drawing the head back too far. This practice not only detracts greatly from the beauty of the animal, but is equally cruel, and causes much discomfort and suffering by forcing the neck and head out of its natural position. Many otherwise fine animals are thus spoiled through the ignorance and false notions of beauty in their owners.

**The Chest.**—The chest of the horse should be large and roomy, as it contains the vital organs, the heart, lungs, etc., upon the free action of which the perfect health and strength of the whole system so largely depends. If the heart be in a healthy condition, the entire system will be very likely to be healthy; but if the heart be diseased, there will be weakness or disease of the physical system. Neither this organ, or the lungs, can be in a vigorous and healthy state, unless they are well developed, and are allowed sufficient room for action.

The blood is circulated by the action of the heart, but it can only be purified by coming in contact with the air, in passing through the lungs. Now, if the lungs and heart are compressed within a narrow chest, it can readily be seen that such an animal will lack one of the great essentials of a perfectly developed, healthy body. The lungs of the horse occupy a much larger space when he is in active exercise than when at rest, consequently the more speed is required of him, the greater the necessity of his being able to increase the size of the chest, to give ample room for these organs.

The following, descriptive of the proper form of the chest, is from Youatt's work, the noted English authority on the horse: "The front of the chest is a very important consideration in the structure of the horse. It should be prominent, broad, and full, and the sides of it well occupied. When the breast is narrow, the chest has generally the same appearance: the animal is flat-sided, the proper cavity of the chest is diminished, and the stamina of the horse is materially diminished, although, perhaps, his speed for short distances may not be affected. When the chest is narrow, and the fore-legs are too close together, in addition to the want of bottom, they will interfere with each other, and there will be wounds on the fetlocks, and bruises below the knee.

A chest too broad is not desirable, but a fleshy and a prominent one: yet even this, perhaps, may require some explanation. When the fore-legs appear to recede, and to shelter themselves under the body, there is a faulty position of the fore-limbs, a bend, or standing over, an unnatural lengthiness about the fore parts of the breast, sadly disadvantageous in progression.

The spaces between the ribs are occupied by muscles firmly attached to their edges, the fibers of which cross each other in the form of the letter X. By the prolongation thus obtained, they have a much greater latitude of action than they would have if they run straight from rib to rib. The ribs, while they protect the important viscera of the thorax from injury, are powerful agents in extending and contracting the chest in the alternate inspiration and expiration of air.

This leads to a very important consideration, the most advantageous form of the chest for the proper discharge of the natural or extraordinary functions of the thoracic viscera. The contents of the chest are the lungs and heart:—the first, to render the blood nutrient and stimulating, and to give or restore it to that vitality which will enable it to support every part of the frame in the discharge of its function, and, devoid of which, the complicated and beautiful machine is inert and dead; and the second, to convey this purified arterialized blood to every part of the frame.

In order to produce, and to convey to the various parts, a sufficient quantity of blood, these organs must be large. If it amounts not to hypertrophy, the larger the heart and the larger the lungs, the more rapid the process of nutrition, and the more perfect the discharge of every animal function.

Then it might be imagined that, as a circle is a figure which contains more than any other of equal girth and admeasurement, a circular form of the chest would be most advantageous. Not exactly so; for the contents of the chest are alternately expanding and contracting. The circular chest could not expand, but every change of form would be a diminution of capacity.

That form of chest which approaches nearest to a circle, while it admits of sufficient expansion and contraction, is the best—certainly for some animals, and for all under peculiar circumstances, and with reference to the discharge of certain functions. This was the grand principle on which Mr. Bakewell proceeded, and on which all our improvements in the breeding of cattle were founded.

In the heavy draft-horse, the circular chest is no disadvantage, and it gives him what we require, weight to oppose the weight of his load. Speed is not demanded of him.

Some of our saddle-horses and cobs have barrels round enough, and we value them on account of it, for they are always in condition, and they rarely tire. But when we look at them more carefully, there is just that departure from the circular form of which mention has been made—that happy medium between the circle, and the ellipse, which retains the capacity of the one, and the expansibility of the other. Such a horse is invaluable for common purposes, but he is seldom a horse of speed. If he is permitted to go his own pace, and that not a slow one, he will work on forever; but if he is too much hurried, he is soon distressed.

Then for the usual purposes of the road, and more particularly for rapid progression, search is made for that form of the chest which shall unite, and to as great a degree as possible, considerable capacity in a quiescent state, and the power of increasing that capacity when the animal requires it. There must be the broad chest for the production of muscles and sinews, and the deep chest to give the capacity or power of furnishing arterial blood equal to the most rapid exhaustion of vitality.

This form of the chest is consistent with all the lightness that can be rationally required. The broad-chested horse, or he that with moderate depth at the girth swells and barrels out immediately behind the elbow, may have as light a forehead and as elevated a wither as the horse with the narrowest chest, but the animal with the barrel approaching too near to rotundity is invariably heavy about the shoulders and low at the withers. It is to the mixture of the Arabian blood that we principally owe this peculiar and advantageous formation of the horse. The arch is light, some would say too much so before, but immediately behind the arms, the barrel almost invariably swells out, and leaves plenty of room where it is most wanted for the play of the lungs, and at the same time where the weight does not press so exclusively on the fore-legs, and expose the feet to concussion and injury.

Many horses with narrow chests, and a great deal of daylight under them, have plenty of spirit and willingness for work. They show themselves off well, and exhibit the address and gratify the vanity of their riders on the parade, or on the park, but they have not the appetite nor the endurance that will carry them through three successive days of hard work.

Five out of six of the animals that die from inflamed lungs are narrow-chested. There are many other important points, but that which is most of all connected with the general health of the animal, and with combined fleetness or bottom, is a deep, broad, and swelling chest, with sufficient lengthening of the *sternum*, or breast-bone, beneath. The impropriety of tight-girthing may readily be seen, especially where it is unnecessary, as in the stable, for instance, or when the rider is off from the saddle.

The *sternum*, or breast-bone, is a long, flat, spongy bone, forming the floor of the chest. It supports the ribs by the connecting cartilage, and is composed of from seven to nine pieces united together by cartilage. The point of the breast-bone is occasionally injured by blows, and has even been completely broken off. A kind of tumor on it, difficult to heal, has also been produced by some cruelty or violence."

Again the same authority says:—"The question then is, what service is required from the horse? If he has to carry a heavy weight, and has much work to do, he should be ribbed home—the last rib and the hip-bone should not be far from each other. There is more capacity of chest and of belly—there is less distance between the points of support—

and greater strength and endurance. A hackney (and we would almost say a hunter) can scarcely be too well ribbed home.

If speed, however, is required, there must be room for the full action of the hinder limbs; and this can only exist where there is sufficient space between the last rib and the hip-bone. The owner of the horse must make up his mind as to what he wants from him, and be satisfied if he obtains that; for let him be assured that he cannot have everything, for this would require those differences of conformation that cannot possibly exist in the same animal."

**The Bones.**—The bones are the frame-work of the system, and give support and protection to the body. It must be remembered that size is not the true index of strength with respect to the bones of an animal, but rather, size and texture combined. Large bones are often coarse and porous in texture, while small bones will frequently be found hard and firm, and possessing much more strength than those of larger size, as is shown, for instance, by a comparison made between a section of the cannon-bone of a low-bred cart-horse, and that of a thorough-bred animal. The former was found open and porous, while the latter is firm and solid; in fact, so compact that it may be polished to resemble ivory. The leg of a thorough-bred horse, although much smaller than that of a cart-horse, may, as shown, be much stronger than the latter; therefore, although the bones should be of suitable size for the purposes to which the horse is to be used, their texture is of equal importance, and should not be overlooked, by either the purchaser or breeder.

**The Shoulder.**—The shoulder should vary, according to the type of the horse, and the purposes for which he is to be used. The draught-horse should have a large, powerful neck, an upright, thick, and heavy shoulder, and, withal, there must be an abundance of muscle, flesh, and fiber, so that the weighty collar he is obliged to wear will fit well, and seem, as it were, a part of him, thus distributing the pressure evenly, in drawing heavy loads.

For saddle and carriage use, the shoulder should be oblique, and the withers high, as this gives the animal more freedom in moving, and renders him less liable to stumble when on the road.

The slope of the shoulder also adds to his capacity to stride with ease, and thus renders a horse well adapted to saddle and carriage use. The rule laid down by Youatt and others is, that the oblique shoulder, being less exposed to concussion in rapid action, is indispensable to horses where extensive and rapid action is required, but for horses where use requires them to throw as much weight as possible into the collar, an upright shoulder is of more advantage. Roadsters and what are commonly termed gentlemen's carriage-horses, as well as saddle-horses, should, therefore, have oblique shoulders, while those that are used principally for draught, should have the shoulders upright.

The humerus, or second bone in the shoulder, should be of good length, and supplied with powerful muscles, while a good fore-arm is equally essential.

**The Limbs.**—However superior a horse may be in all respects relative to his head and body, he becomes inefficient unless these desirable qualities are accompanied with good limbs and feet.

It is, therefore, of the greatest importance that the horse not only have limbs suited to the body, and the duties he is required to perform, but that they, as well as the feet, receive good care, in order to be kept in a sound and healthy condition.

Youatt says: "Whatever other good points the animal may possess, if the arm is narrow in front and near the shoulders, flat on the side, and altogether deficient in muscular appearance, that horse is radically defective. He can neither raise his knee for rapid action, nor throw his leg sufficiently forward."

The fore-arm, or radius, can scarcely be too long, or well supplied with muscles, as these muscles move the leg and foot. The cannon bone should be small, short, hard, and solid. A short cannon usually accompanies a long fore-arm, especially in horses of great speed.

The arm should be large where it joins the body, admitting of strength by giving it a firm attachment to the trunk. The sinews of the leg should be large, indicative of large muscles and strength. A broad, flat leg denotes great strength and endurance.

The following cuts will serve to give a better idea of the bones of the lower limbs of a horse, than can be given by a verbal description:—

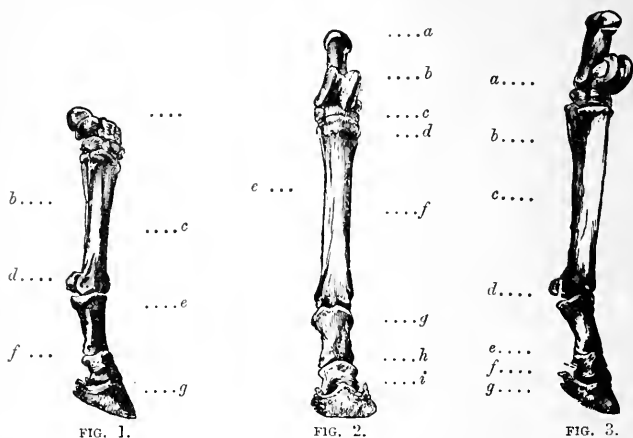


FIG. 1.

FIG. 2.

FIG. 3.

Fig. 1 shows a side view of the bones of the fore leg; *a* represents the bones of carpus; *b*, splint, or what is sometimes termed the splint bone; *c*, cannon bone; *d*, sesamoid bone; *e*, pastern bone; *f*, coronet bone; *g*, coffin bone.

Fig. 2 represents the front view of bones of the hind legs; *a*, *b*, *c*, *d*, *e*, bones of the tarsus; *f*, cannon bone; *g*, pastern bone; *h*, coronet bone; *i*, coffin bone.

Fig. 3 illustrates a side view of the hind leg; *a*, bones of the tarsus; *b*, splint bone; *c*, cannon bone; *d*, sesamoid bone; *e*, pastern bone; *f*, coronet bone; *g*, coffin bone.

These, together with a cut of the skeleton of a horse hereafter given in connection with diseases of this animal and their treatment, will enable the reader to obtain a correct idea of the location of all the bones.

With regard to the position of the fore leg when standing, Carson says: "The leg should drop perfectly straight from its junction with the shoulder to the ground; and the point of the toe should come as near as possible to a straight line under the point of the shoulder."

**The Pastern.**—In the draft horse the pastern should be strong, short, and nearly upright, while in the trotter it should be long and well slanted, so as to give the movement of the horse that easy, elastic, springing character that relieves the ends of the upright bones of that fearful concussion which would otherwise invariably occur when trotting upon the race-course or in running and leaping in hurdle races. Besides, when under saddle, horses that have long pasterns are easy and comfortable for the rider. But in this, as in almost everything else, the "happy medium" is to be preferred for general purposes, for if the pasterns are too long, or slope too much, there will be a tendency to spraining or weakness of the back tendons.

Fig. 4 represents the pasterns of a horse.

*a.* The shank bone

*b.* The upper and larger pastern bone.

- c.* The sesamoid bone.
- d.* The lower or smaller pastern bone.
- e.* The navicular or shuttle bone.
- f.* The coffin bone or bone of the foot.
- g.* The suspensory ligament inserted into the sesamoid bone.
- h.* A continuation of the suspensory ligament, inserted into the smaller pastern bone.
- i.* The small inelastic ligament, tying down the sesamoid bone to the larger pastern bone.
- k.* A long ligament reaching from the pastern bone to the knee.
- l.* The extensor tendon inserted into both the pasterns and the coffin bone.
- m.* The tendon of the perforating flexor inserted into the coffin bone, after having passed over the navicular bone.
- n.* The seat of the navicular joint lameness.
- o.* The inner or sensible frog.
- p.* The cleft of the horny frog.
- q.* A ligament uniting the navicular bone to the smaller pastern.
- r.* A ligament uniting the navicular bone to the coffin bone.
- s.* The sensible sole between the coffin bone and the horny sole.
- t.* The horny sole.
- u.* The crust or wall of the foot.
- v.* The sensible laminae to which the crust is attached.
- w.* The coronary ring of the crust.
- x.* The covering of the coronary ligament from which the crust is secreted.
- z.* Place of bleeding at the toe.

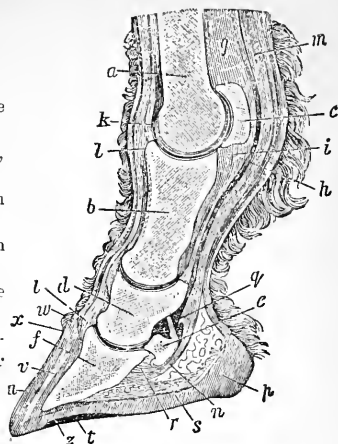


FIG. 4.

**The Hock.**—This is where lameness frequently occurs in a horse, therefore in order to avoid difficulty in this respect, and that it may be strong enough to bear the severe strain that hard labor brings upon this part of the leg, the hock should be large. It is well, then, to look for large, well-proportioned hocks in a horse, whether it be for trotting, draft, or general purposes. The line of distance between the hip and hock should be long, thus bringing the latter low down towards the foot.

**The Foot.**—The foot of a horse should be of medium size, neither too large nor too small. A large flat foot is very undesirable, and suggestive of a coarse and porous bony structure above it. The animals that are most fleet, such as the antelope and deer, have small hoofs. The wild horse also has a hoof of rather small or medium size. The different parts of the foot are somewhat complicated, but the design in their formation is simple and easily understood. The hoof is made up of a series of thin layers of horn, nearly five hundred in number, nicely fitted the one to the other, and forming a firm and solid lining to the foot itself.

Besides this, there are numerous other layers which are elastic belonging to what is termed the "coffin bone," and which are fitted into this. It is estimated that there are about four thousand elastic layers in the four feet of the horse, upon which the weight of the entire body rests, which enable them not only to bear the great weight of the body, but also the additional burdens that may be placed upon him.

The flat foot is usually weak and troublesome to both the horse and his owner. The

length of the foot on the ground should be greater than its breadth, and the breadth should be greatest across the center, lessening towards both the toe and heel. The heel should be of medium height, neither too high nor too low. The hoof should also be of fine texture, smooth and tough-looking. A brittle hoof is very objectionable. The frog should be large and healthy, and never be cut, or otherwise tampered with. Reasons for this will be fully given in connection with the subject of shoeing.

**The Back.**—It is generally conceded by all experienced horsemen the world over that, other conditions being equal, the strength of a horse's back is inversely in proportion to its length, the short-back being the strong back, and the long back the weak one. Consequently the short-backed horse has proportionately greater powers of endurance as well as strength. Flora Temple was a short-backed horse, and usually ended her victorious summer campaign in a better condition than when she began. Maud S., Governor Sprague, Taggart's Abdallah, Dexter, Thorndale, and other noted animals, are also horses of this type. Such a formation of the spinal column as produces considerable of a dip or hollow immediately back of the withers is objectionable, since it interferes with the space which should be occupied by the heart and lungs, and affords them less room than is essential for their perfect development.

**The Hind Quarters.**—Here is where both speed and strength lie, while the fore legs are designed, for the most part, for support. They are, in fact, the great moving power of the body. These impel the body forward through the air, and also start the heavy loads. The hind-quarters of the animal should, therefore, be so constructed as to admit of great strength and endurance, which should be with long bones well placed, and long powerful muscles, by means of which these bones are to be moved.

The rump should be of medium width, although narrowness at this point should be avoided, being an indication of a lack of strength.

The thigh bone is heavily overlaid with large, powerful muscles, which constitute the principal moving power of the whole body. This bone should be long, in order to admit of a long stride, and consequently speed in the animal. Shortness of this bone and the one below it indicate that the horse is incapable of taking long strides, and is consequently a short stepper. The muscles that surround them should also be long, heavy, compact, and well developed inside, as well as outside the thigh. Flat or soft muscles here are a sure indication of a want of power.

**The Teeth. — Determining the Age of Horses, etc.**—It is a truth recognized by horsemen of all nations, and from the earliest records of which we have any knowledge of the horse, that his age can only be determined with any certainty by the appearance of the teeth.

Xenophon, in his writings, alludes to the custom of selecting cavalry horses for the Grecian army by this means, and the rejection of such as had lost the dental mark. Various Roman writers, such as Columella, Virgilius, and Varro, also mention the practice of examining the teeth of horses in order to determine their age.

So many arts and deceptions are practiced by crafty and dishonest dealers at present, in manipulating the teeth, that unless a person is well skilled in judging and handling horses he would be very liable to be deceived in this respect. The adult horse has forty teeth; six incisors or nippers, two canines or tusks, and twelve molars or grinders to each jaw. The canines are generally wanting in the mare. An additional small tooth sometimes makes its appearance in advance of the upper molars. The incisors are placed close together at the terminus of the jaw. They have greater length and curvature than those of ruminants, and differ also by the fold of enamel which penetrates the crown. As the tooth is worn down, this fold becomes a ring of enamel with a cavity filled by cement and particles of food, and is denoted by horsemen as "the mark."

In aged horses this mark disappears altogether, owing to the wearing down of the tooth below the extent of this enamel fold. This occurs in the lower mid-incisor when the horse is six years of age, in the next pair at seven, and the outer pair at eight years. This "mark" remains considerably longer in the upper teeth.

The grinding teeth are long, and have heavy, square crowns composed of enamel, dentine, and cement intermingled, so that when worn down they present an uneven and ridgy surface, owing to the enamel and dentine being so much harder than the cement. There are two sets, the temporary or milk teeth, which are the first, and the permanent teeth which succeed them. The canines are wanting in the colt, and generally in mares, as previously stated. The following facts relative to this subject are derived mainly from Youatt's noted work on the horse.

The germs of the teeth are visible in the jaw seven or eight months before the birth of the foal. At the time of birth, the first and second grinders have made their appearance, and seem very large in proportion to the size of the jaw. When the colt is seven or eight days old, the two center nippers or incisors appear at the end of the jaw. During the first month, the third grinder appears on the upper and lower jaw, and soon after, and usually by or before six weeks have expired, another incisor comes by the side of the first two, on each jaw. When the colt is two months of age, the center incisors or nippers will have grown their full length, and between the second and third month the second ones attain the same level. Between the sixth and ninth month another pair of incisors appear by the side of the others, making six on each jaw, after which the only apparent difference in these teeth, until between the second and third years, is in the wear. At six months of age, the four incisors are worn to a level.

**At the Expiration of the First Year**, or shortly after, a fourth grinder is seen, and the colt then has six nippers and four grinders in each jaw, above and below, which will enable one to determine its age at this period. When it has attained the age of *a year and a half*, the mark in the central incisors will be considerably shorter and fainter; that in the two other pairs will be somewhat changed, and all of them will be worn flat.

**At Two Years** this change will be still more apparent. When about this age a fifth grinder will be seen, and the new process of shedding the milk or temporary set commences. The necessity of this is readily seen, since the first set are only adapted to the size of the jaw and necessities of the colt, but as these bones expand with the increased growth of the animal the teeth become separated too far apart from each other to be useful, and a larger set will be required to occupy the space, and also to meet the demands of the system.

By the gradual growth and pushing up from below of the permanent teeth, the fangs of the first set are absorbed until the second teeth are near the surface of the gum, when the former drop out. When the second teeth appear by the side of the first, they will be absorbed partially their entire length, will become narrow, and will be pushed out of place. These should always be drawn to give the permanent teeth room, and to prevent injury to the mouth or cheek, which sometimes happens if this is neglected.

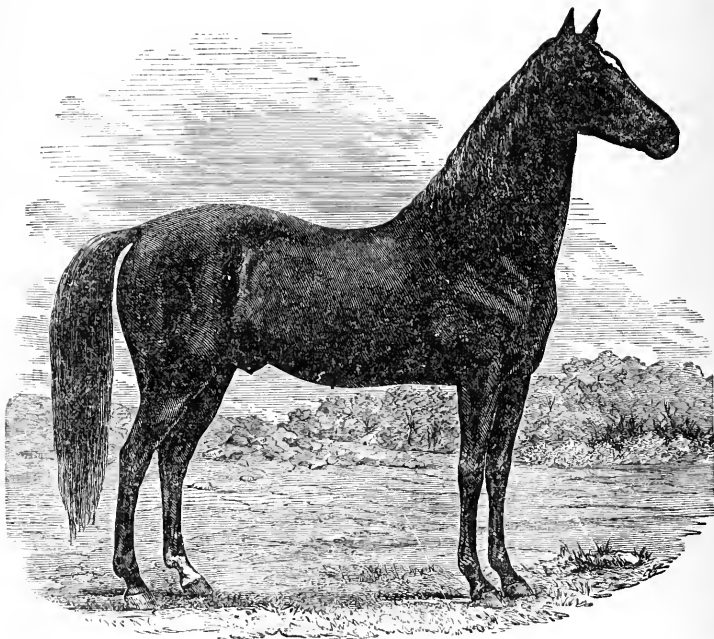
At this period the colt should be fed cut or mashed feed, as he will be liable to find difficulty in eating.

**At Three Years of Age** the sixth grinder is generally through, or if not, its appearance is indicated by the swelling of the gum at that point.

From three and a half to four years of age, the central nippers will have reached nearly their full growth, the second pair will just be making their appearance above the gum, or a space will be left where the first ones stood. The corner ones will be greatly diminished in breadth, and worn down so that the "mark" will be small and faint. At this time, the second pair of grinders will also be shed.

**At Four Years,** the central nippers will be fully developed, the sharp edge somewhat worn off, and the mark shorter, wider, and fainter. The next will be up, but they will be small, with the mark deep and extending across them. The sixth grinders will have attained the level of the others, and the canines or tushes will begin to appear.

At this period, the dishonest dealer will endeavor, more than at any time previous, to make the animal seem older than he really is, as the difference between a four-year old colt and five-year old horse with regard to strength, utility, and value, is great; but the lack of wear in the middle nippers, the small size of the corner ones, and slight growth of the tushes, besides the smallness of the second grinders, lack of depth in the mouth, and disproportionate length of limbs in the animal, will be sufficient to expose the deception.



BLACK HAWK, JR.

(Property of S. W. Ficklin, Charlottesville, Virginia.)

The tushes are four in number, two on each jaw, located between the incisors and grinders, and nearer the former than the latter. *At four years and a half*, or between that and five years of age, the last important change takes place in the mouth of the horse. The corner nippers are then shed, and the permanent ones begin to appear. The central ones are considerably worn, and the next pair begin to show marks of usage somewhat. The tush is now cut through and generally a full half-inch in length. The colt is now considered a horse, and the filly a mare.

**At Five Years,** the corner nippers are well up, containing the long, irregular, deep mark in the inside, and the other nippers showing evidence of wear. The sixth molar is now up,

and the third molar wanting. The three last grinders and the tushes are never shed. *At six years*, the mark on the central nippers is worn out, but there will still be a difference in color in the center of the tooth. In the next pair the mark is shorter, broader, and pointed, and in the corner teeth the edges of the enamel are somewhat worn. The tushes or canine teeth have now attained their full growth, and are nearly or quite an inch long, the grinder is fully grown, and all the grinders on a level. The teeth are now all of them fully grown. *At seven years* of age, the "mark" is worn out in the four central nippers, and is wearing away in the corner teeth. The tush also at this period will begin to get rounded at the point and edges.

**At Eight Years**, the mark is gone from all the bottom incisors, and the tush is more rounded in every respect. After this period, nothing remains in the bottom incisors to define definitely the age of the horse.

It is stated by good authority that dishonest dealers resort to the following mean and cruel method of prolonging the mark in the lower nippers of the horse: The horse is thrown down, an excavation dug with an engraver's tool in the plain surface of the corner teeth, in a form resembling the mark of a seven-year old horse, after which the cavity is burned with a hot iron, which leaves a permanent black stain. The next pair of nippers are then slightly touched. By this means a horse nine or ten years old is made to have the appearance of one of seven years of age, to a person inexperienced in judging the age of a horse. But to the experienced eye this deception is easily perceived by the irregular appearance of the cavity, the black stain around the tushes, the sharpened edges and concave inner surface of which can never be given again, the marks on the upper nippers, and the general appearance of the horse.

*After eight years* of age, sometimes some slight marks may be seen in the nippers of the upper jaw, the marks remaining longer there than in the lower nippers, which is generally believed to be one or two years. *At nine years* of age, the mark will be obliterated from the middle upper nippers, from the second pair at *ten*, and from all at *eleven*. The teeth also undergo a great change, being shorter and more rounded.

**After the Horse is Eleven Years Old**, and until very old, the age may be determined with a considerable degree of accuracy from the shape of the upper surface of the nippers. At eight years they are oval, but as the animal gets older, their surface becomes round instead of oval, the teeth become diminished in size, and by lessening in width, become separated a little apart from each other. *At eleven years* the second pair of nippers are quite rounded and the corner ones at thirteen. *At fourteen*, the faces of the central nippers become rather triangular, and at seventeen they all have this appearance. *At nineteen*, the angles begin to wear off, and the oval form is again assumed, but in a reversed manner, that is, from outward, inward. *At twenty-one*, all the nippers have this form.

Circumstances will, of course, vary with different conditions, methods of feeding, the care the animal has received, etc., but the above rules for determining the age will be found, in the main, reliable. The diminution of the bars of the mouth denote increasing old age, they becoming less prominent at ten years. Other indications of old age, aside from those of the teeth, are gray hairs over the eyes and about the muzzle; sunken appearance of the eyes, and the deepening of the hollows over them; thinness of lips, as well as their hanging down; sinking of the back, sharpened appearance of the withers, and the disappearance of tumors of every kind.

Horses, when kindly treated, will remain quite vigorous for a long period, and also will attain great age. We have known of their reaching the age of forty-five years, and still be quite active. An account is recorded by Mr. Percival of a horse that died in his sixty-second year. American Eclipse was used successfully in Kentucky for stock purposes at the age of

thirty-one; but these are very rare instances. From the commonly hard usage that the horse receives, he rarely ever lives beyond the age of twenty-five or thirty; in fact, many horses are subjected to such severe labor, and so much abused, that they are old and decrepit at thirteen or fourteen years of age.

**Color.**—The color may seem an unimportant point to some persons in regard to a horse, providing he be really a valuable animal; but to individuals of fastidious taste, and who have an eye for beauty, an undesirable color would prove a serious objection. It is generally conceded that bay, chestnut, dark brown, and black are the most desirable colors in a horse, the preference being in the order in which we have given, and, other conditions being equal, horses of these colors will bring a higher price in market than those commonly considered less desirable, such as white, light gray, light sorrel, cream-colored, spotted, etc. A dark bay, with no white about him, and with black tail, mane, and legs from the knees and hocks down, is generally conceded by horse-fanciers to be the most beautiful color, while the chestnut and dark brown might be regarded next in order in this respect.

**Hints to Purchasers of Horses.**—It would be impossible to lay down any definite rules with respect to judging of the fine points in a horse that would take the place of the experienced and practiced eye of the skilled horseman; but a few hints may be given which will prove of value to the inexperienced in this respect. The first thing to be determined before purchasing a horse is the kind of an animal necessary, and that will be adapted to the labor required of him. This will involve the consideration of size, form, strength, endurance, temperament, disposition, color, and various other things which have already been definitely treated in the preceding pages of this department of the work. We would advise, first, in all cases to examine carefully the head, note the expression of the eye, and determine the disposition and temperament of the animal, after which the other qualities. The following directions to inexperienced purchasers of horses, given in a treatise on the horse, by D. C. Linsley, of Vermont, will be found of value to many:—

“When the purchaser is unaccustomed to horses, we would advise him, after determining what kind of a horse he wants, to engage some reliable person to assist him who has had more experience, especially if he is about to purchase of a stranger, for in the latter case he will not only be liable to misjudge as to the justness of the animal's proportions, but also as to the soundness and vices, for a vast number of faults and defects may, by artful jockeys, be concealed from the inexperienced eye, and sometimes even from the closest and most intelligent examination.

If, however, the purchaser avail himself of no such assistance, or chooses to trust to his own judgment, he cannot be too cautious. When you enter the stable, observe carefully the way in which the owner approaches his horse. If, as soon as he comes within hearing, he speaks to him in a loud, sharp voice that makes the horse spring up in his stall as if frightened, look out for some defect in his limbs. If much lame, it will be seen when he is moved; but if the lameness is very slight, you may not notice it. If the owner comes up to the horse very carefully, and seems a little cautious about going into the stall where he is, you may justly suspect that he is not kind and pleasant-tempered. If he approaches the horse in an easy, careless, but quiet way, you may reasonably expect that the horse has no such vices to hide, and you will not suspect him of lameness, though it should not prevent your watching carefully every motion of his limbs to see if you can detect it.

Mark how the horse stands, how he is hitched, and what kind of a halter he has on. If he stands with one of his fore-feet far in advance of the other, look out for founder. If he is fastened with more than ordinary care, see if you can observe any signs of his having attempted to untie his halter with his teeth. If the halter is fastened very tight round his throat, he may have a trick of slipping it off, or he may be a cribber. A large strap, buckled close round the throat, will often prevent cribbing.

Youatt considers crib-biting unsoundness; and it is, at all events, a very bad habit, that materially injures the sale of a horse. If the manger shows signs of being bitten by the horse, do not purchase the animal until you have seen him eat. The teeth of an old "cribber" almost invariably show signs of this habit, being much worn on the outer edge, but in young horses it will not always be noticed.

When the horse is turned out of his stall and faces the light, observe whether he shuns it, and partially closes his eyes; if so, his eyes are weak; if, on the contrary, he looks boldly about, with a bright and lively expression, his eyes are not only good, but you may infer that he is both spirited and tractable. Examine the head carefully. If it is thoroughly good, light, lean, and graceful, with tapering, sharp-pointed ears, ever moving and restless, the eyes animated and prominent, the forehead broad, the muzzle firm, the nostrils large, and the whole well set upon the neck, you may be pretty sure that it belongs to a good horse.

If the eye is not bright and lively, it should be carefully examined. Sometimes the eye will look very natural, and the horse appear bright and well, yet be perfectly blind. If the horse is entirely blind, you may easily detect it, for though some horses move about very easily and handily when perfectly blind, you will soon notice the defect if you watch him and permit him to move about freely. If you are suspicious that, although not entirely blind, his sight is defective, you may determine it by passing some small object like a stalk of hay rapidly before his eyes, and at a short distance from them, taking care that the substance be not large enough to create any perceptible motion of the atmosphere, for a blind horse will wink at the least unnatural current of air.

The appearance of the head is a pretty sure index of the age of the animal, and the inexperienced buyer will do well to rely as much upon this general appearance as upon the appearance of the teeth; for with a saw and a filing-iron old teeth may be made to resemble so closely those of a young horse as to deceive even pretty good judges. In the old horse, the eyes are usually a little sunken, and the hollows over the eyes are deepened, the lips are less firm and close, and the mouth shows the long use of the bit. If the head is satisfactory, next examine the legs, and see that they are not too long, are wide, *flat, bony*, and free from flesh below the knees and hocks. When the muscles are well developed, and stand well out from the bones, and are free from any fat or meat, they can be distinctly traced by the eye through the skin. See that the horse stands squarely and equally upon them, and that they are neither stretched too far apart nor gathered too much under him. Examine closely whether there be any unnatural enlargements or bunches on either leg. If none can be detected by the eye, then pass the half-closed hand carefully down each one, pressing the leg moderately, to determine whether there are any bunches or scars concealed by the hair.

Look carefully at the hocks for spavins, curbs, or thoroughpin, for, although the latter do not constitute unsoundness, yet they are objectionable. Pass the hand carefully down the back sinews to detect any unevenness in the muscle. If any little bunches are found, or the cord is anywhere enlarged, examine carefully for any scar that may indicate that the injury was an external one. If there are no signs of any such injury, and especially if the muscle at this point feels sore, reject the animal. The back sinews have been strained, if not ruptured, and there is little chance that he will ever be able to endure hard service. Search for bunches on the inside of the fetlocks; if you find them, or scars, you will attribute them to the horse's cutting. If the scars are old, and the horse being in very high flesh yet travels very close, it will be wise to reject him, for in ordinary flesh he will be likely to cut, and this is one of the most unpleasant defects in the horse, and one that is very difficult to remedy. Press the hand closely and carefully around the pastern, for ringbone, or cling-fasts, that are just commencing to form, and will be detected more easily by the hand than the eye. This is the more important, as ringbone is one of the worst kinds of unsoundness, and the horse may not at all times and in all instances be sufficiently lame to enable the buyer to detect it.

The knees are often too carelessly examined. It is not enough that there is no trembling of the joint, that it shuts back well, and is well shaped. If there are any bunches, hard or soft, or any scars in front, it is a pretty sure sign that the horse is a stumbler, and is unsafe.

Just below the knees, and upon the inside of the leg, look for splints; if small, and removed from the joint, they may in no way affect the usefulness of the animal, but they are unsightly and objectionable. The feet require the closest scrutiny. Reject horses that have split or flat hoofs, as they will be fit only for slow work. Where the feet are high and narrow at the heels, it is a serious objection, as such feet are very liable to founder, and other diseases.

The legs and feet proving satisfactory thus far, take a look at the body. If the ribs are round, the back short, and his wind good, little more need be required. To determine the soundness of the wind is sometimes difficult, especially if the horse is in high condition, and has been dieted and medicated with the view of concealing some defect in it. The best way to determine this is to make him trot briskly about one hundred rods, and as soon as he has done this, let him stand perfectly still and watch closely his breathing. If he breathes easily, and without any apparent effort, and especially if, as soon as he stops, he draws one or two long breaths that fill the lungs to their utmost capacity, without any appearance of distress, his wind may be pronounced good; but if there is the least evidence of painful respiration, or catching for breath, something is wrong, and the animal should be rejected. Heaves, or broken wind, is a common disease at the East, but at the West it is comparatively very rare; hence, the purchaser will be more on his guard to detect the disease in a horse raised at the East, than in one raised at the West.

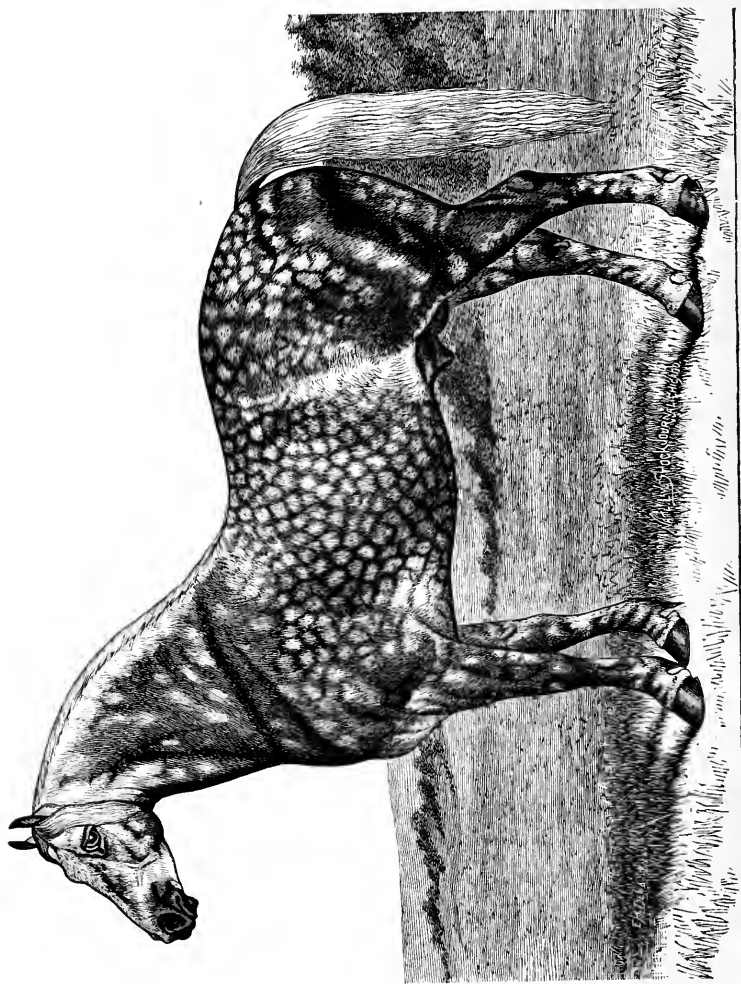
While the horse is moving, notice carefully his action, and to do this take such a position that he can move by you on level ground, and at a sufficient distance from you to give a good view of him. Notice particularly the action of the forelegs, see that the joint at the shoulder plays freely, that the feet are not raised too high, that he reaches out boldly in his step with his forelegs, and throws his weight freely upon them. If he does this, you may be pretty sure the feet are sound and good, and the shoulders unhurt. On the contrary, if the horse does not carry his feet well forward, but takes a short, mincing step, and puts down his feet cautiously, they are unsound; and if the legs seem stiff, and tied up at the shoulders, he is chest-foundered. These things should be carefully observed when the horse is first moved, for if he is but a little stiff in his shoulders, the stiffness generally disappears entirely after a little exercise.

After having carefully noticed these things, and also his general style and appearance, take such a position that you can watch the movement of his feet as he comes directly towards you, and goes directly from you; see that he carries forward his feet in a straight line, and that he does not travel too close or too wide, for if very close he will be apt to cut, or interfere, and if too wide, his gait will be labored and awkward.

While the horse is moving, see if he hesitates to turn short and quick; if he does, and appears in the least stiff in the back, you may conclude that he has been strained there, and a horse that has once been severely strained in his back rarely, if ever, fully recovers, and is unfit for any kind of business, but if the back is such as we have described, there will be little danger of this complaint.

These defects, at which we have glanced, by no means comprise all the diseases or defects of the horse, nor are the methods we have pointed out in all cases the only ones. We have aimed only to glance at the most serious and ordinary defects, and point out the simplest means of detecting them. Some quite common defects we have not noticed, as, for instance, string-halt. This is not considered unsoundness in ordinary circumstances, and where it is so bad as to become seriously objectionable, it cannot fail to be noticed by the most careless observer.





**PERCHERON-NORMAN STALLION "ROMULUS."**

Winner of 1st Prize at Paris Exposition, 1878. Imported by M. W. Dunham, Wayne, Ill.

To some, this kind of examination may seem tedious and laborious, and to the inexperienced horseman it may be so; but the horseman of taste, with a practiced eye, will determine the freedom of an animal from the objections we have referred to in a small fraction of the time it has taken us to describe them.

We have said nothing upon those subjects that are merely matters of taste, as to enter into a discussion of them would occupy more space than we could devote to it.

One wishes a horse that shall have a bold, resolute style of action, and a high temper that prompts him to keep a constant and heavy pull upon the reins. Another wishes a horse of less spirit, with a quiet, pleasant temper, and a mouth that only feels the bit, that is never restless, never pulls, and so gentle that his wife and children can manage him. Yet he does not want a dull, stupid animal; on the contrary, one that is bright and lively, and that when gently urged will move off at a lively pace.

One wants a horse that is round and smooth, with soft hair, a beautiful color, and a proud, showy style, that will attract the admiration of his neighbors, but cares little about its speed upon the road, or its powers of endurance, while his next-door neighbor cares far less for the showy style and the beautiful color, and values his horse solely on account of his useful qualities. In short, no rules can be laid down that will determine the excellence of the animal in these respects, as so much depends upon the precise service which is demanded of him, and the taste of the purchaser.

Although people differ much in their opinion as to the color, style of movement, etc., of their carriage-horses, yet the anxiety to own a free, nimble driver, is nearly universal, and might almost be styled a national characteristic.

But the passion for horses is co-extensive with man's acquaintance with them, and is confined to no nation, no portion of the human family; indeed, there are comparatively few persons who take no interest in his history, no pleasure in training or using him.

Other animals may be as useful to man, but they do not so lay hold of human affections and sympathies. He is at once his companion and servant in his long and weary journeys. With the same patience and unflinching courage, he carries his rider safely over the scorching sands of the desert, or treads with careful step the icy footpaths of the mountains. He waits with silent patience his master's pleasure, and moves only at his bidding. Heat and cold do not shake his courage, hunger and thirst do not drive him to rebellion. The soothing sound of his master's voice stills his restlessness when he wishes him to be quiet, and the cheering, encouraging tones of the same voice rouse him to the noblest efforts to do his will."

**Thorough-Bred.**—This is a term that is often improperly used in connection with horses. Technically, it means, when properly applied, that the animal's pedigree can be traced back to the East, or rather, that he is of a breed derived from a Barb or Arabian ancestry.

English juries have frequently decided that a horse that is warranted thorough-bred is returnable, if any defect can be traced in his pedigree, or, in other words, if it can be proven that his pedigree is not directly traceable, on the side of both sire and dam, to imported Barb or Arabian stock. This, then, is the technical meaning of the term, and proves that in this sense there can properly be but one breed of horses designated as thorough-breds. It is the oldest and purest breed in existence, and is noted for speed, endurance, strength, energy, and courage. The genealogy of this race of horses has been carefully recorded in a stud-book for nearly a hundred years, and the records of their achievements upon the race-course, both in this country and Europe, are the most noted in the history of the horse. They were introduced into this country at a very early period, and so frequent have been the importations of the choicest animals of this type, that they are identical with those of the old country. A leading authority thus describes the thorough-bred:—

"All running horses are of this breed, and none but thorough-breds can make a credit-

able showing in long-distance or heat races. A horse with a dash of this blood may make a fast race for a short distance, but it takes the genuine stuff to go a mile and repeat, in good time. They are of all colors, bay, brown, and chestnut predominating; are rather light of bone, and long in the body, with thin neck, small head, wide between the eyes, finely-pointed ears, long quarters, and deep chest, and are usually rather 'leggy.' In height they are from 15 to 16½ hands, although they may sometimes be found a half a hand above or below these figures. They are nervous, restless, determined, and excitable, and are highly valued for crossing upon all other breeds."

Beyond the technical meaning of the term thorough-bred, some writers give it a practical signification, and employ it to denote certain essential qualities that give superior value to the animal, and determine his rank in the grade to which he belongs. These qualities may comprise beauty of form, compactness and strength of bone and muscles, intelligence, activity, docility, and the various other desirable qualities that give value to the horse. The true thorough-breds, according to the technical and proper signification of the term, are, without doubt, the finest horses in existence, and to that blood are we indebted for some of the finest qualities that our best types of horses possess. Yet, notwithstanding this, a poor horse, as well as a man of inferior ability, will ever remain such, whatever his ancestry may be, and a pure thorough-bred will occasionally, though rarely, be found to be a very inferior animal, since there are exceptions to almost every rule, the world over, and while the law of nature, that "like produces like," will be the general rule, there will occasionally be an exception, and a poor animal will sometimes possess a fine pedigree, and the reverse; some noted animals having sprung from unknown ancestry. Pedigree has, however, great significance, and a good horse with a good pedigree is the one to be desired. The superiority of thorough-bred horses over the common stock, will be found generally to consist in a superior form, physical organization, and intelligence, while from their intelligence, they are more kind and tractable in their disposition. Possessing a superior organization, they are less liable to disease, and live and maintain their usefulness to a much greater age. They have greater endurance, are superior in action, and more elegant in appearance; they are also superior in breathing powers, fleetness, and bravery.

As we have previously stated, the bones of a thorough-bred horse are more solid and fine in texture than those of horses of the common type, while his tendons are much stronger and better defined, and his muscles more firm and elastic. Such a horse will perform much more labor in a given time, with less exhaustion, and be able to repeat the task oftener, than an animal of inferior blood. For all the common and general purposes of farming, or for a carriage horse simply, the thorough-bred horse will be found greatly superior to those of common class, and this should be borne in mind, whether in purchasing, or breeding.

**The Percheron-Norman.**—These horses are frequently called Normans, or French horses. The breed originated in La Perche, an ancient province of France. Importations from that country to this have been very extensive for more than a quarter of a century past. These horses are noted for great strength and endurance, being much used for draft. They are usually fifteen and a half, or sixteen and a half hands high, although some of the larger types of the breed are occasionally seventeen hands. In temperament they are sanguine, mixed in variable proportions with the musco-lymphatic. In color they are quite uniform, being nearly always gray, although occasionally other colors, such as the black, roan, bay, or chestnut, are seen. It is estimated by good authority that fully ninety per cent. of them, both in this country and France—from where they are imported—are gray. They are large animals, those imported to this country ranging in weight from 1400 to 1900 lbs. They generally have a good head, mild, expressive eyes, rather short neck, denoting strength; high withers, a broad, deep chest, short rump, sometimes slightly drooping, and body well rounded. The mane and tail are abundant. They are very docile, possess great strength and





"NAPOLÉON III."—Half-blood Percheron-Norman Stallion; weight, 1,000 lbs.  
Property of M. W. Dunham, Wayne, Ill.

endurance, and, in proportion to their size, are quite active. These horses are much used in the Western States, while an infusion of the blood upon the common stock of the country is very apparent in nearly all sections. It is to this blood that may be attributed largely the excellence that distinguished the Canadian horses about half a century ago, this breed having been introduced into Canada by the French settlers.

While the Percheron-Norman horse is used principally for draft and heavy work, the light or smaller types are frequently employed upon the road. The result of a cross with this breed upon the common horses of the country has been found very satisfactory in producing an improvement in strength, and hardiness.

**The Clydesdale.**—This breed of horses derives its name from a district on the Clyde, in Scotland, where it was first introduced by one of the dukes of Hamilton, by crossing with the imported Flemish stallions. It is adapted principally for draft, and is much prized for this purpose. Importations of the Clydesdale have been made into this country to the extent that they are now bred here in considerable numbers. In color, the bays and browns are most numerous; but there are occasional blacks, sorrels, and grays among them. Whatever the color of the body, they nearly all have strong, distinct markings of white in the face and on the feet, with, frequently, white spots under the body. An abundance of hair on the legs is considered a good point in a well-bred Clydesdale, while the tail and mane are quite heavy and inclined to be naturally wavy. In height, they range from fifteen to seventeen hands, while sometimes one will be found eighteen hands high. In weight, they range from 1500 to 2100 pounds, one being found occasionally that will reach 2500 pounds.

The pure-bred Clydesdale is somewhat larger than the Percheron-Norman, and is also longer in the body and hind-quarters than the French horses. He is heavier-boned than any other breed, according to his weight, and particularly in his limbs, which are of great width, flat, sinewy, and hard. It is said that at the bone-mills the bones of this breed can be readily distinguished from those of ordinary horses, by their size and solidity. He has generally a good eye and head, well-shaped neck and shoulders, and a round, straight body. These horses possess great strength and endurance, and are naturally gentle in disposition. The back of the legs, from the knee and hock to the fetlock, are covered with quite long hair, a characteristic greatly prized by the Scotchman, as being an evidence of the purity of the breed. The Clydesdale is frequently crossed with the heavier class of common horses with good results.

**English Draft.**—The native English breed, variously termed the English Draft, Cart, or Shire horse, is the largest draft horse known. It is supposed to have been first introduced into England through the invasions of war. Their improvement dates from the last century, at which time stallions were imported from Holland. From that time, by judicious crossing and breeding only from the best, and with especial reference to large, powerful draft horses, adding occasionally (as is quite probable) a mixture of the Scotch Clydesdale, a breed has been established of gigantic size, commonly known in Europe and America as the English Draft horse.

The famous brewers' horses of London, which average a full ton in weight, are of this breed. Notwithstanding their immense size and strength, however, they are symmetrical and attractive in form, and may be described as follows: Head short and heavy in appearance; face oval on lower part and broad above; mouth large, with thick lips; eyes small and mild-looking; ears broad, thick, and short; the neck arched; heavy at throat-latch, and thickening towards the shoulder; shoulder with a moderate slant, with withers extending well back; barrel round and "well ribbed up;" rump-bones wide apart, but not prominent, rump drooping to the tail; short quarters, with thick, round buttocks; the upper limbs are not only well-proportioned, but well-shaped; the lower part heavy and bony, with long hair behind, similar to the Clydesdale; feet large.

They possess great endurance and strength, and make excellent draft horses, although a lighter animal would be desired for common use.

**Boulonnaise Draft.**—This breed was first brought into notice in the vicinity of Boulogne, but has rapidly spread throughout the region of Paris. They are thus described:—

“They are of about 1,600 or 1,700 pounds weight, and have a handsome form for a large animal. Their action is more clumsy than graceful, and they are principally used for very heavy draft purposes, where great strength is needed instead of speed. The moving of the heavy blocks of stone used in the buildings of Paris is done with these horses. It is not unusual to see six or eight of them hitched in line, drawing blocks of several tons' weight, which of necessity must move very slowly. They are mostly gray in color, but bays and blacks are not uncommon. For the purposes to which they are by nature adapted, they are entitled to be classed among the best of draft horses.”

**The Conestoga** is descended from early importations from Flanders and Denmark, and is a mixture of several breeds, but owes its principal characteristics to the former-mentioned sources. A heavy roadster, he was more frequently employed as a draft horse, and was formerly extensively reared in Pennsylvania. The best types of this variety possessed fine symmetry and great power, and were much preferred by the German emigrants of that State. They are now rarely met, having been superseded by the Percheron-Norman, Clydesdale, and other breeds for draft purposes.

**Cleveland Bays.**—As the name indicates, the prevailing color of the horses that bear this name is a light bay. They were first known in the district of Cleveland. In the latter part of the eighteenth century, this district became noted for producing a heavy breed of horses suited for cavalry or the coach, and from their history it appears that they are part thoroughbred, being a cross between the race-horse and the large horses found in the country. The old Cleveland horses were very large, and noted for their strength. They are reputed to have carried on their backs a weight of 760 pounds, (or more than 54 stone,) a distance of sixty miles in twenty-four hours. This old race is now nearly extinct, the animals that at present bear that name having but a slight resemblance to them, these having been changed in size and form by careful breeding, to meet the modern ways of travel, since on the improved public highways of England the old-fashioned, cumbersome coach is now for the most part useless. Consequently these animals have been considerably reduced in size by the infusion of thoroughbred blood, so as to conform to the new order of things for which they are in demand, both at home and in other countries.

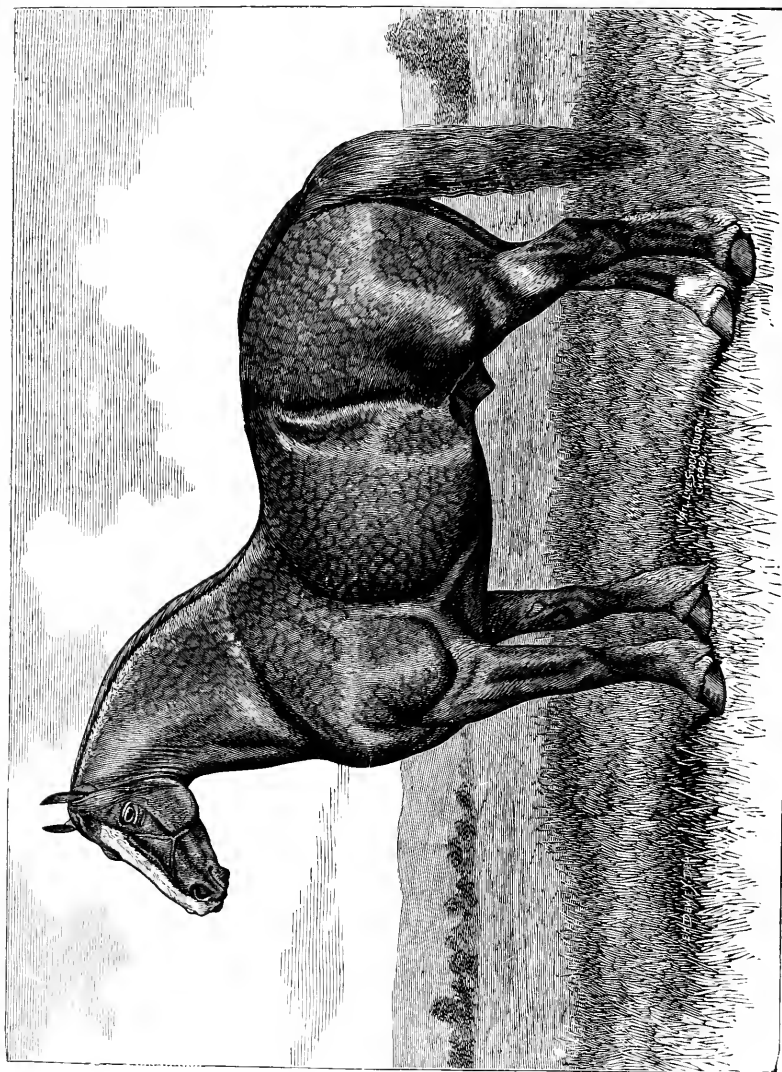
They combine the necessary size for ordinary or general-purpose use, with style, action, and endurance, while they have a beautiful color, which is transmitted to their offspring with as much certainty as characterizes the Devon cattle. If exhibited at a fair, they would probably be catalogued as either family, carriage, coach, or saddle-horses, their average weight being about 1,400 pounds.

Youatt, speaking of the improved Cleveland Bay, says:—“Now we have an animal tall, deep-chested, rising in the withers, slanting on shoulder, flat in the legs, with far more strength and treble the speed.”

Another writer describes them as follows:—“The modern Cleveland Bay is a large, elegant horse, standing 16½ to 16¾ hands, and weighing from 1,350 to 1,500 pounds; a fine head; full, bright eye; long, arched neck; oblique shoulders; deep chest; short back; long quarters; strong, clean, cordy legs, and perfect feet. Their color, bay; full, flowing mane and tail, and black legs, usually clear of white.

Cleveland Bays are very strong-blooded, and impress their characteristics on their grade offspring with certainty. They have long been very popular in all parts of Europe for coach purposes, and also for light artillery and cavalry.”





**ENGLISH DRAFT STALLION "LINCOLN."**

(Age 4 years, height 16½ hands, weight 1,790 lbs.) Imported by Geo. E. Brown & Co., Aurora, Ill.

These horses are also valuable in the intelligent breeder's hands for modifying some other cross; but in this matter of producing handsome, stylish carriage and coupé animals, the breeder must have in his mind a standard which he desires to attain, and then govern himself accordingly.

We are certainly not lacking in the elements necessary to produce with certainty the large, stylish carriage-horse in this country, and it only remains necessary for our breeders to direct their attention to supplying this demand, which is growing rapidly both in America and Great Britain.

**The Hambletonians.**—The Hambletonian family of horses are noted for their speed and power of endurance, and make excellent carriage-horses. Some of the most noted trotters belong to this race. In mentioning a list of the most noted trotting horses with their record, in connection with this family, a recent authentic writer says:—

"One noticeable feature of this list is that no other family is represented with two or more performers the get of one horse; another is that the fastest record (Maud S., 2.10 $\frac{1}{4}$ ;) the second fastest (St. Julien, 2.11 $\frac{1}{4}$ ;) and the third fastest (Goldsmith Maid, 2.14,) are made by two granddaughters and one grandson of the famous horse Hambletonian, showing that he had the power to transmit his excellences to his sons, and thus to perpetuate not only his great fame, but his name and his family as well. Hence, we see not only the importance, but the value of a sire who transmits his qualities in the male line of descent."

This race descended, on the paternal side, from imported Messenger (a thoroughbred), through his son Mambrino (also a thoroughbred), who was the sire of Rysdyk's Hambletonian, the dam being by Bellfounder, an imported Norfolk trotter, and her dam probably having two direct crosses to Messenger. Through Rysdyk's Hambletonian, on the paternal side, we have a long line of celebrated horses, such as the Volunteers, the Edward Everetts, the Alexander Abdallahs, the Almonts, the Messenger Durocs, the Sentinels, the Happy Mediums, and all the various so-called Hambletonians of the present day.

Hambletonian was a developed trotter, and possessed the power of transmitting his good qualities to his descendants. At three years of age he trotted in 2.48 $\frac{1}{2}$ , and could trot in 2.40 at any time when matured. In color, he was a bright bay with black extending above the knees and hocks, and white hind feet, also a small star in the forehead. This noted animal was foaled in 1849, bred in Orange County, New York, and sold with his dam when only a few months old to William M. Rysdyk for \$125. He died when twenty-seven years of age, after establishing the most noted family of trotters in existence.

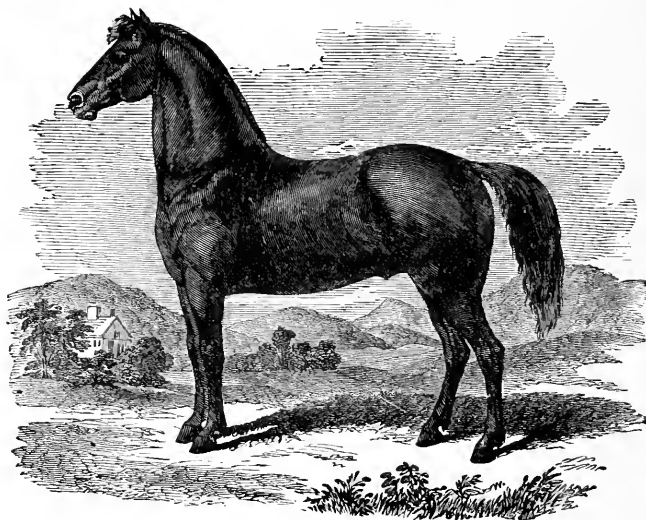
**The Messengers.**—This class of horses are celebrated as both roadsters and trotters. The founder of this family was Messenger, the son of Mambrino, a thoroughbred, and one of the most celebrated running horses of the English turf. He was imported to this country after having achieved several successful races in England, having won the king's plate in 1785, being then five years of age. He was in color a beautiful dark gray, fifteen and three-quarters hands high, and stoutly built, having a peculiar formation of limbs, large forehead, and deep quarters. He died at the age of twenty-eight years. Some of the most renowned of his immediate descendants are Hambletonian, Lady Suffolk, Abdallah, and Engineer.

The Hambletonians are claimed by some to be a cross between the Morgans and Messengers, uniting the excellences of both. His stock was justly celebrated, and although it may be doubted whether animals of this family may now be found possessing sufficient resemblance to each other or to their progenitor, from whom they derive their name, to be classed as a distinct and permanent variety, yet the effect of this blood is still very perceptible in many sections of the country.

**The Morgans.**—This is a noted family of horses, of which the famous horse called Justin Morgan was the progenitor. They may perhaps be called our oldest trotting family,

and although they have not produced animals of the very fleetest type, they doubtless justly merit the very highest rank as fine-tempered, hardy, and desirable roadsters. The popularity of this family of horses seemed at one period unbounded; in fact, no blood, except the thoroughbred, has been more generally disseminated throughout this country, or more highly esteemed. At the present time, they are not so highly valued by those whose main object is speed, and who place that above all other qualities, but, as a certain writer has said—

“Go where you will among livery-stable keepers or horse-railroad managers, and ask them what type of horse they have found most profitable to use and wear out on the road, and they will almost invariably answer, ‘the old-fashioned Morgan.’”



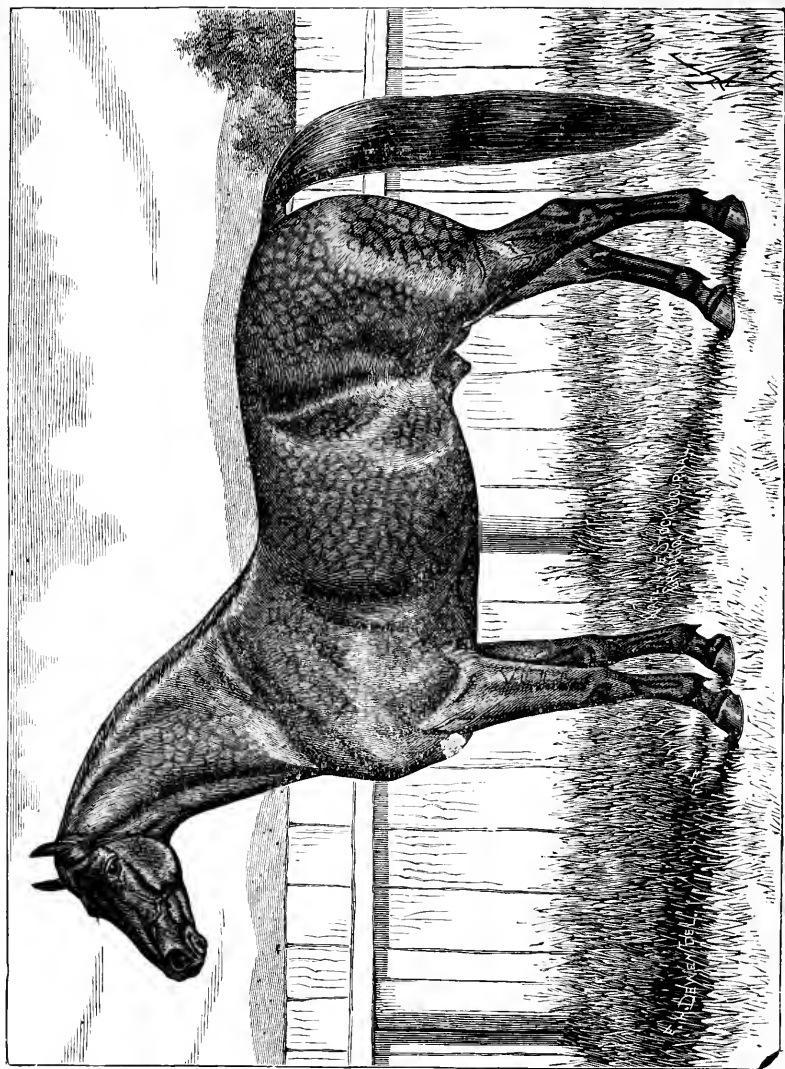
JUSTIN MORGAN.

Justin Morgan was bred in Vermont, foaled in 1793, and died in 1821. His ancestry is not positively known, although it is generally believed that the thoroughbred blood predominated. The following accurate and interesting description and history of Justin Morgan is given in Mr. Linsley's work on "The Morgan Horse":—

"The original, or Justin Morgan, was about fourteen hands high, and weighed about nine hundred and fifty pounds. His color was dark bay with black legs, mane, and tail. He had no white hairs on him. His mane and tail were coarse and heavy, but not so massive as has been sometimes described; the hair of both was straight and not inclined to curl. His head was good, not extremely small, but lean and bony, the face straight, forehead broad, ears small and very fine, but set rather wide apart. His eyes were medium size, very dark and prominent, with a spirited but pleasant expression, and showed no white round the edge of the lid. His nostrils were very large, the muzzle small, and the lips close and firm.

His back and legs were perhaps his most noticeable points. The former was very short; the shoulder-blades and hip-bones being very long and oblique, and the loins exceedingly broad and muscular. His body was rather long, round, and deep, close ribbed up; chest deep and wide, with the breast-bone projecting a good deal in front. His legs were short, close-jointed, thin, but very wide, hard and free from meat, with muscles that were remark-





**CLEVELAND BAY STALLION "BAY SPLENDOR."**

Imported by George E. Brown & Co., Aurora, Ill.

ably large for a horse of his size. This superabundance of muscle exhibited itself at every step. His hair was short, and at almost all seasons soft and glossy. He had a little long hair about the fetlocks, and for two or three inches above the fetlock on the back side of the legs; the rest of the limbs were entirely free from it. His feet were small, but well shaped; and he was in every respect perfectly sound and free from any sort of blemish. He was a very fast walker. In trotting, his gait was low and smooth, and his step short and nervous. He was not what in these days would be called fast; and we think it doubtful whether he could trot a mile much, if any, within four minutes; though it is claimed by many that he could trot it in three.

Although he raised his feet but little, he never stumbled. His proud, bold, and fearless style of movement, and his vigorous, untiring action have perhaps never been surpassed. When a rider was on him, he was obedient to the slightest motion of the rein; would walk backwards rapidly under a gentle pressure of the bit; and moved sideways almost as willingly as he moved forward; in short, was perfectly trained to all the paces and evolutions of a parade-horse. When ridden at military reviews (as was frequently the case), his bold, imposing style, and spirited, nervous action attracted universal attention and admiration. He was perfectly gentle and kind to handle, and loved to be groomed and caressed; but he disliked to have children about him, and had an inveterate hatred for dogs, if loose always chasing them out of sight the instant he saw them. When taken out with halter or bridle, he was in constant motion, and very playful.

He was a fleet runner at short distances. Running horses short distances for small stakes, was very common in Vermont fifty years ago. Eighty rods was very generally the length of the course, which usually commenced at a tavern or grocery, and extended the distance agreed upon, up or down the public road. In these races the horses were started from a 'scratch,' that is, a mark was drawn across the road in the dirt, and the horses, ranged in a row upon it, went off at 'the drop of a hat' or some other signal. It will be observed that the form of Justin Morgan was not such as in our days is thought best calculated to give the greatest speed for a short distance. Those who believe in long-legged racers will think his legs, body, and stride were all too short, and to them it may perhaps seem surprising that he should be successful, as he invariably was, in such contests.

But we think his great muscular development and nervous energy, combined with his small size, gave him a decided advantage in the first start over taller and heavier horses; just as any ordinary horse can distance the finest locomotive in a ten-rod race. At all events, the history of racing in this country and England proves conclusively that small horses *may* have great speed. In such a race, a horse of great spirit and nervous energy derives a decided advantage from these qualities, especially after being a little accustomed to such struggles. When brought up to the line, his eyes flashed and his ears quivered with intense excitement, he ground the bit with his teeth, his hind legs were drawn under him, every muscle of his frame trembled and swelled almost to bursting, and at the given signal he went off like the springing of a steel trap. His unvarying success in these short races may perhaps be partly accounted for in this way, though he was undoubtedly possessed of more than ordinary speed, and was a sharp runner.

Among the many races of this description that he ran were two in 1796, at Brookfield, Vermont, one with a horse called Sweepstakes, from Long Island, and the other with a horse called Silver Tail, from St. Lawrence County, New York; both of these he beat with ease. Mr. Morgan (who then owned him) offered to give the owner of Silver Tail two more chances to win the stake, which was fifty dollars, by walking or trotting the horses for it, which was declined. There are many accounts of other races which he ran and won; but, these accounts not fully agreeing as to the details, we have not mentioned them.

In harness Justin Morgan was quiet, but full of spirit; an eager and nimble traveler,

but patient in bad spots; and although for a long time steadily engaged in the heavy work of a new farm, his owner at that time informs us that he never knew him refuse to draw as often as he was required to; but he pithily adds, 'I didn't very often, have to ask him but once; for whatever he was hitched to generally had to come the first time trying.' This uniform kindness at a pull was one of the striking characteristics of the horse, and the same trait may be observed in the greater part of his descendants. 'Pulling matches' and 'pulling bees' were as common in those days as short races, and the 'little horse,' (as he was often called,) became quite celebrated for his unvarying willingness to do his best, and for his great power at what is called a 'dead lift.'"

The Morgan horses were spirited, with fine action, but kind and docile in disposition. They were from thirteen and a half to fifteen hands high, being of medium size, with finely-formed head and neck, symmetrical bodies, deep chest, short back, and long quarters; mane and tail heavy. Though horses of fine type, and well adapted to the road, they are regarded by many as too small for a general-purpose horse on the farm, and consequently are not, as previously stated, in as high repute as formerly, although still highly valued by many. Among the noted descendants of Justin Morgan may be mentioned Black Hawk, Gifford, Ethan Allen, Morrill, Taggart's Abdallah, Gen. Knox, Fearnought, and Lambert. This family of horses possessed the power of transmitting their excellent qualities to their offspring in a remarkable degree, and dominating over other bloods with which they were crossed, so that wherever found, a Morgan horse would at once be known by the peculiar characteristics which distinguish this family.

**The Orloff.**—This is the most celebrated of the Russian breed of horses. It takes its name from a Russian count who was an enthusiastic horseman, and who, in 1775, imported from Arabia a fine gray stallion of unusual size and strength named Sometaxa. This stallion was the progenitor of the Orloff race, which are noted for large size and fine action, while great pains are taken in training them to trot, and to prevent them from moving in any other gait than a walk, or trot. Many of them are very fine trotters, but do not quite equal in speed the trotting horses of America, as will be seen by the following table giving the best Orloff record.

It is stated that Count Orloff was an intelligent enthusiast in the enterprise he established, and persistently refused to part with any of his breeding stock, preferring to dictate with respect to perpetuating and improving this race of horses. After the Count's death the stud was scattered—a portion of it passing to the crown. Private studs were established about this time, and an Orloff stud-book instituted. As a means of developing the trotting powers of his horses, Count Orloff had been a patron of the race-course, and since his death the Russian Government has furnished more than half of the prize money expended in the established trotting races. Russian trials of speed are regulated by laws, and the result of a violation of any of the rules laid down for the purpose of securing a fair contest, renders the owner or driver liable to a severe penalty, not less than that of a trip to Siberia at the Government's expense. Mons. Jules Goujon, who has resided for many years in Moscow, says:—

"The entries for the races are according to age qualifications, except that for horses past six years old they are free for all. The heats are never less than three versts, and the deciding heat is at the same distance. In races of four and one-half versts, the deciding heat is at three versts. Races of six and twelve versts, are decided in one heat. The first prize is not given to the horse who comes in first in the race, but in the deciding heat. The number of horses entered in each race is unlimited, but they are started three at a time, and the two horses out of the entire number of starters who trot the distance in the least time, according to the watch, take part in the deciding heat. If the horse winning in the first trial comes in second in the second trial, then a third heat settles the question of supremacy. Only two moneys are given. There are three tracks, one for each horse, of oval shape, enclosed one

within the other. The outer is  $1\frac{1}{2}$  versts (one mile) long; the two others are shorter, one by 12 sagesnes (84 feet), and the other by 23 sagesnes (161 feet). The first horse is started on the exterior track, in front of the stand, and the two others, in order to equalize the distance, are started in the rear, on their respective tracks, which are selected by lot.

The horses come up at a jog, each one to his place. A judge is placed beside each horse, whose duty it is, by waving a bit of cloth, to notify the starter, who is in the stand, that the horse under his charge has arrived at his position. The horses are started from the stand by the stroke of a bell, which sets in motion at the same time the hands of a great dial, which mark minutes and seconds. At the instant that the first horse passes the winning-score, the judge strikes a blow which stops the first hand of the dial, and in the same way for the second horse. This automatic system gives the time of the race, by means of the clock, without error, and enables the judge, who is placed at the distance-post, to decide which of the horses are distanced, to better know the precise instant when the race is finished. A distance in Russia is 30 sagesnes (210 feet) for a race of three versts, and 75 sagesnes (525 feet) for a race at a greater distance. Only three false starts are allowed; after that number the judges can fine the driver of the horse that is responsible for the false starts, or can refuse to allow him to go the course. In case a driver does not try to win with a horse, the judges may fine him, and on a repetition of the offence he is liable to visit Siberia for a couple of years—a punishment which I imagine, from what I hear, would be salutary for some of your American drivers.

A horse is not allowed to make but three breaks during a heat of three versts, and the same number in the deciding heat. If he makes more, he is out of the race, and so is he if he makes more than thirteen jumps in one gallop. Each horse in the race has a judge especially assigned to watch his movements, whose decision as to whether the horse makes more than three breaks, or more than the permitted number of jumps in one break, is without appeal; he has only to touch a button of an electric machine designating the offending horse, and a groom on horseback, in front of the stand, at once rushes off to notify his driver to quit the track.

For all the prizes given by the societies, any one can trot as he pleases to a droschka (the national Russian vehicle, four-wheeled, and very clumsy and heavy as compared with the sulky) or to a sulky with two wheels and four reins. The weight of the vehicle and of the sulky is equally *ad libitum* for all the prizes given by the societies. The Government, for prizes which it gives, specifies for itself the kind of vehicle, its weight, the weight of the driver, and the distance to be trotted.

There are two seasons for racing. The summer races occur in May and June, and are trotted twice a week. They are started at six o'clock in the evening, the days being so long in Russia that it is light until eleven o'clock at night, and thus the heat of the day is avoided, which is an advantage for both the horses and the spectators.

In winter the races are always trotted on Sundays, and on the ice. But two horses are started at a time, and on the opposite sides of the same course, which is but one verst in length."

The droschka referred to, although a clumsy-looking vehicle, is very light, weighing only about seventy pounds. The verst is 3,500 feet in length, being a little less than two-thirds of a mile.

The best "Orloff" time for thirty versts (twenty miles) is 1 hour 8 minutes 30 seconds. The following table shows favorably for our American trotters:—

Best Russian time.		Best American time.		Dif.
One mile.....	2:31	One mile.....	2:10½—20¼s.	
Two miles.....	5:01½	Two miles.....	4:50½—11¼s.	
Three miles.....	7:52½	Three miles.....	7:21½—31¼s.	
Five miles.....	13:56½	Five miles.....	13:00—56½s.	
Twenty miles.....	1:08:30	Twenty miles.....	58:25—10m. 5s.	

From the foregoing, the superiority of American trotters for speed is clearly seen. Between 700 and 800 of our trotters have beaten the best one-mile time made in Russia, and though two-mile races are somewhat rare in this country, yet the fast Russian time for two miles (5:01 $\frac{3}{4}$ ), made by their famous trotter, Poiïieshnoy, has been beaten by nearly all our great trotters; and to-day there are probably fifty horses in America that can beat that time by several seconds.

The Orloff is a spirited, well-formed animal, of fine action and elegant carriage. But few of this breed have thus far been imported into the United States. The horse "Sobol," one of the best specimens in this country, was bred by Count Nicholas Sollogub, of Tambou, Russia, and imported by his present owner, Mr. Robbins Battell, of Norfolk, Conn., in 1876. He is black in color, and 15 $\frac{3}{4}$  hands high. He was foaled in 1870, sired by Dehrody, 4th; dam, Pobaida, by Krelïka, tracing back directly to Belley Smetanka, who was brought from Arabia by Count Orloff Tehesmenkoi in 1775.

**The Canadian Horse.**—This race of horses is of the Norman descent, introduced from France by the early settlers of Canada. For many generations they were bred pure, and possessed the general characteristics of the Norman, except that they gradually became somewhat smaller than their progenitors. This is supposed to be owing to the cold climate, and the more scanty fare on which they have subsisted.

They are annually imported in large numbers into the New England and some of the other northern states, where they have proved valuable for farm use, and as a general-purpose horse.

They are from fourteen and a half to fifteen hands high, have strong, compact muscles, large bones, in proportion to their size, and great power of endurance. They are also active, docile, easy to keep, and will perform a vast amount of hard labor, without any appearance of breaking down. They perpetuate their strong points, and are withal a very valuable animal for the purposes to which they are best adapted. There are many varieties of these, some having been crossed with the English thoroughbred. They are regarded as very valuable for producing crosses with other breeds.

**Shetland Ponies.**—These are the smallest of the pony breeds, many of them not being more than seven or eight hands high, and, in fact, the average height is not more than nine or ten hands, or from thirty-six to forty inches. It is claimed that no true Shetland ever reached eleven hands in height. They have round bodies, closely ribbed, with heads well shaped, and often with the dish-face of the true Arab. The ears are small and erect, eyes large and intelligent in expression, neck short and strong, shoulders thick and sloping; withers low; back slightly hollowed, loin strong and wide; tail and mane very heavy and long. The legs and hoofs are well-formed and strong, while as a breed, these little creatures possess a wonderful amount of endurance and strength. They are said to perform journeys of forty miles a day, upon the rocky and hilly pathways in their native country. They are generally in color dark sorrel, brown, and black; although sometimes spotted with considerable white. When bred in a half wild state, they often suffer for want of food, even subsisting on the coarsest that can be found; such as kelp and sea-weed that are found along the shore. The most perfectly-formed animals of this breed are found in the extreme northern islands of Unst and Tell.

Though they will sometimes resent injuries by the use of the heels, like the mule, yet when kindly treated and petted, they become very docile, being strongly attached to their masters, and make admirable playmates for children, as will be seen by the following respecting them from the *London Field*:—

"The ponies are not an agricultural, but a domestic necessity. In Shetland, as in parts of Ireland, every family depends for its supply of fuel on peat; and as the peat is seldom

found near at hand on the shore where the houses stand, but on the hill behind them, — there is always a hill in the rear in Shetland, every island consisting mainly of hill, with a patch or two of 'smooth' land in a few snug nooks by the shore, — and as it often is at a distance of several steep and stony miles, each house requires several ponies, the number depending on the distance, and the character of the road. A family living 'convenient' to the peat may require only two peat-carriers, and another family may require half a dozen.

The material, after it has been dug and dried in the usual manner, is carried home on the backs of the ponies in baskets called 'cassies.' It is obvious that the back which has to perform this kind of service should be broad and strong. A pony belonging to a breed which has had to pick its zigzag way down a steep declivity during many generations must be sure-footed. By the same rule, a pony whose grooms and playmates include a dozen juveniles — the children of the neighborhood, who roll about underneath him or upon his back — must be gentle; and the same pony, living on air sometimes, rather than on herbage, must be hardy.

The pony of the Shetland Isle is, in fact, the offspring of circumstances. He is the pet of the family, gentle as the Arab's steed under similar training. He will follow his friends indoors like a dog, and lick the platters, or the children's faces. He has no more kick in him than a cat, and no more bite than a puppy. There is no precedent for his running away, nor for his becoming frightened or tired, even when he has carried some stout laird from Lerwick to his house, many Scotch miles across the hills. In crossing boggy spots, where the water is retained, and a green carpet of aquatic grass might deceive some steeds and bring them headlong to grief in the spongy trap, he carefully smells the surface, and is thus enabled to circumvent the danger.

In the winter, the Shetland pony wears a coat made of felted hair, and specially suited for the season. His thick winter garment is well adapted for protecting him against the fogs and damps of the climate. It is exceedingly warm and comfortable, fits close to the wearer's dapper form, and is not bad-looking when new. But, when the coat grows old towards spring, at the season when the new one should appear, it becomes the shabbiest garment of the kind that you often see. Its very amplitude, and the abundance of the material, render it the more conspicuous, when it peels and hangs for a while ragged and worn out, and then falls, bit by bit, till the whole of it disappears. No horse looks at his best when losing his old coat; and the more coat there may be to lose, the worse he looks."

**Mustang, or Prairie Horses.** — These are doubtless of Spanish origin; their prominent and general characteristics all bearing unmistakable evidence of this. The Spanish wars with Mexico and also voyages of discovery and exploration are matters of history, and the supposition is that Cortez lost many horses in his conquest of Mexico, also that the death of DeSoto, who discovered the Mississippi River, must have resulted in the abandonment of many horses, since his followers quickly made their escape to Mexico, from the unfriendly savages. It is also quite probable that many of these animals were abandoned by other adventurers in prospecting for gold and silver, all of which suppositions on the origin of this race of animals are well sustained by probable facts. This animal has also been called the wild horse of North America. There were no wild horses found on the American continent when it was discovered, and those that are now found in a wild or undomesticated state are such as have escaped from domesticity, or have been abandoned, and from them have descended the vast herds that may be found on the plains of South America, Central America, Mexico, Texas, California, and some of the territories.

Those found in Mexico and Texas are under-sized, while those of the more northerly section are considerably larger. The former have small limbs, long neck and back, a long, lean head, although well-shaped and well-set, and wide, open nostrils. Their hoofs are somewhat flat, and their tails and manes are generally very fine. These liberty-loving animals

possess great endurance, are very fleet, and will easily outstrip the fleetest well-bred horse. They are quite useful for saddle purposes when tamed. They are inclined to be vicious, but may easily be managed. They are lightly valued, and may be purchased at a very low rate, owing to the constant and rapid increase of better stock.

Wild horses will always be found divided into squads or herds controlled by the most powerful stallion of the tribe, who holds dominion as long as he is able to do so, or until his place is usurped by a younger and more powerful rival; consequently every herd of wild horses has its leader.

The wild horses of our Western plains have furnished the kernel of many an interesting and exciting story of border-life. It is stated that two or three of these leaders, more powerful than all others, lived and led their herds on the plains of Texas for several years. One was white, and a pacer, and such was his speed and endurance, that although he was pursued by parties mounted on the best horses of the frontier for scores of miles together, yet he was never known to fail to keep a good distance ahead of his pursuers.

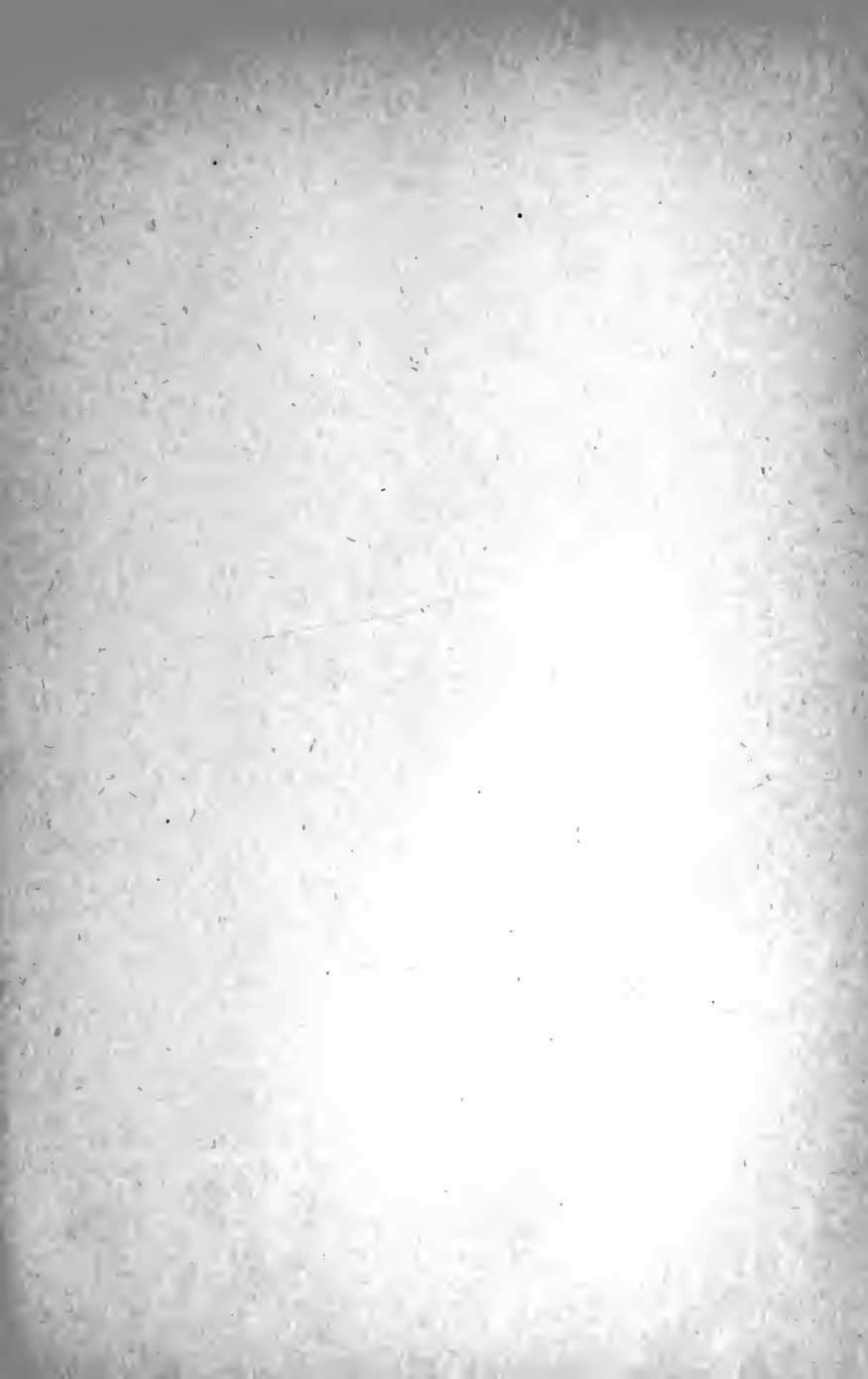
One of the most famous of these roving kings of the plain was captured many years ago in Matagorda County. He was a dun stallion, with a dark stripe down the back, and faint rings about the legs, as are sometimes seen on the mule. *The New York Sportsman* gives an account of the capture of this beautiful animal, as follows:—

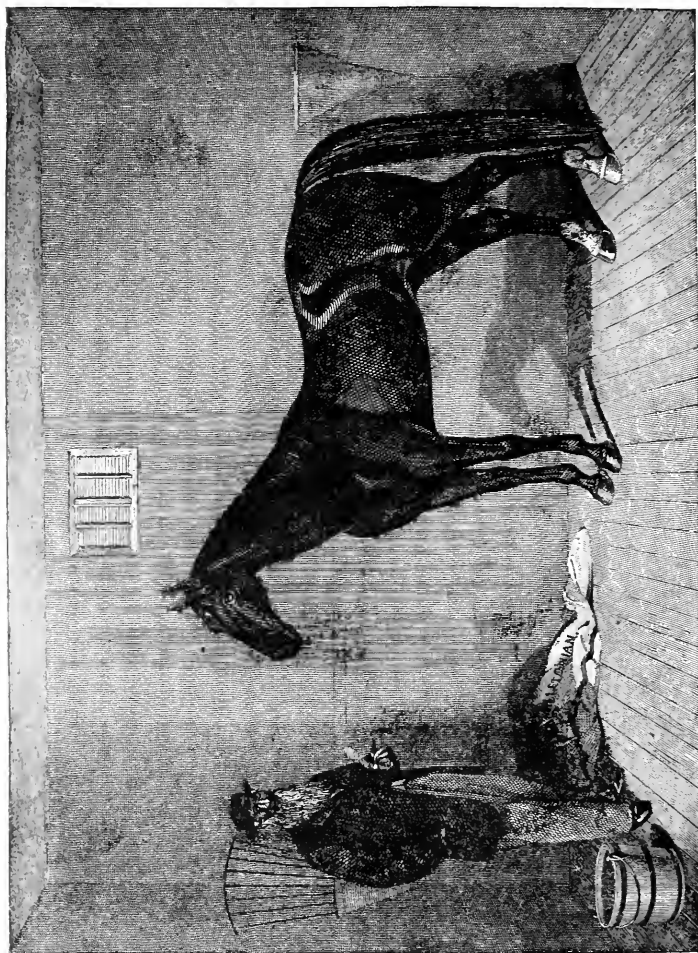
“Between thirty and forty years ago mustangs were to be found in large numbers on every prairie west of the Brazos, and quite a large herd infested that one bounded by the Colorado on the west, and ‘Old Caney’ on the east, (about where the boundary between Matagorda and Wharton Counties now runs,) headed by this famous stallion, afterwards called ‘Boggy’ from the name of a creek by means of which his capture was effected.

These mustangs were very troublesome to the settlers in leading their gentle horses astray, for once with the mustangs they were as wild and unapproachable as the mustangs themselves, and were seldom or never recaptured. So it was resolved by the settlers that this herd should be driven off, and this was impossible without the capture of their leader, the dun stallion; consequently that was determined upon. Old Captain John Duncan, who acquired his title, as master of a steamboat on the Alabama River, when that State was but just out of its territorial form, was one of the wealthiest, most energetic, and prominent men of the settlement, and he was selected to plan the capture.

The range of ‘Boggy’ and his herd was a prairie of about thirty miles circumference, bounded by the bay on the south, Boggy Creek on the north, and Caney and Colorado on the east and west respectively, around which the mustangs always ran when pursued, as they had been ‘many a time and oft.’ The old captain collected about thirty of the best-mounted light-weights of the settlement, and the day before the chase he distributed them in couples about two miles apart around the prairie, where they camped for the night, and were in the saddle at daybreak the following morning, ready to begin the chase.

About good daylight the captain broke away after the herd, which, under the leadership of Boggy, at once took their usual circuit. As they passed the first couple, the boys whooped them up at their best lick for two miles, when the second couple took it up and drove them to the third, and so on round the prairie. After a while the weaker ones began to fail, and were left by the herd, but no attention was paid to them, for orders were to capture Boggy. Away and away they went around the thirty-mile track, once, twice, and all were lagging but the magnificent Boggy, whose beautiful wavy mane and tail streamed in the wind as he swept on with reaching stride, running gallantly, at splendid speed, on, on, on. The sun rose and mounted higher and higher, until he stood at zenith, and looked down upon this wonderful struggle, and still the glorious dun kept on his course, nor seemed to fail of speed or wind, until the shadows slanted away to the east, and the shades of evening were warning the captain that he must redouble his efforts or darkness would put out the





RYSDYK'S HAMBLETONIAN.

hope of capture, for that day at least, and another cavalcade of horses would have to be gathered to renew the race on the morrow.

So, bringing his ingenuity to bear, he gathered several of the freshest couples together, and held them for a final rush. Girths were tightened, stirrups shortened, and lariats were coiled for the dash. They were hidden by a clump of trees from the line Boggy was running, and held well in hand until the poor fellow was entering his fourth round, when out they rushed 'with hoop and spur and loud huzzas,' and crowded him from his course. Round and round they twirled their lariats, and spurred and urged to get within throwing distance, when, sudden as a flash of light, Boggy swerved to the right and plunged headlong into the creek, which, as indicated by its name, was to prove a snare to his feet. Floundering, rearing, and plunging along through the treacherous bog which received him up to his very withers, he was gallantly but slowly making his way to the opposite shore, which a few more plunges would have reached, when, alas! alas! a whirr in the air, and over his beautiful head, and encircling his swelling neck, the fatal noose fell, and Boggy, poor, gallant fellow, was a captive.

It is stated that this stallion Boggy, after his captivity, became very quiet and docile. He was extensively used in the stud, but none of his get possessed especial merit."

When attacked by wolves, as the wild horses on the prairies sometimes are, they display much intelligence and courage. The leader of the drove forms the mares in a circle with their heels outward towards the enemy. Within this circle the foals and half-grown colts are collected for protection. Around the outside all the stallions collect to fight the wolves, while the mares use their heels to good advantage whenever the enemy approaches near enough for the attack.

**The Trotting Horse of America.**—Horse trotting, as a public amusement, seems to have been inaugurated in this country during the first part of the present century, and since that time the desire for fast horses has been on the increase, so much so that many breeders in making speed the main or principal quality aimed at, have seemed to overlook others equally essential, and there is danger of carrying this point to the extent that speed will be secured at the expense of strength and endurance. The development of speed through systematic breeding and training has become one of the great industries of the United States, where it has attained a degree of perfection truly wonderful, and which is not to be found in any other portion of the world.

This interest dates back to the importation of the celebrated thoroughbred, Messenger, in 1788. At the time of his importation, he was eight years old, and was used in the stud for twenty years, in the vicinity of Philadelphia and New York. This horse is generally conceded to be the foundation or progenitor of the American trotting race, since nearly every trotter of this country, whose pedigree is known, traces to this animal, and the more Messenger strains there are in the pedigree, the greater, as a general rule, is the value.

One of the first horses noticed by the public journals of the country for trotting was the "Rat-tailed Gray," that trotted in 1816 on the Salem turnpike, near Boston. He is said to be the same horse that was afterwards called "Boston Blue," that was matched with Col. Bond, of Maryland, and Major William Jones, of Long Island, to trot one mile in three minutes for \$1,000. In this race Boston Blue is recorded as winning, and gained a high reputation for his unexampled speed.

New York and Philadelphia were the first to become interested in associations for developing the speed of the trotter, which associations resulted in great success in improving this race of horses.

In contesting for the premiums in trotting, the descendants of Messenger were found to take the lead. The propensity of this family for fast trotting was first discovered in the second generation, and after the death of Messenger. It is true that there have been many

fast trotters whose pedigree could not be definitely traced to the thoroughbred stock, but it has been found that, in the large majority of cases, the exceptions being rare, the best trotters can be traced to the thoroughbred stock, and there is no question whatever that this is the original source of the fast-trotting blood, they possessing naturally the rare combination of bone and muscle and other essentials that render them peculiarly adapted to speed.

Some horses trot naturally, while others require to be entirely educated to this gait. While so much depends upon the formation of the bones and muscles, and the adaptation of the limbs and body to the trotting gait, all horses require considerable training to become educated to the degree of developing their best capacity in this direction. The principal families that are at present distinguished as trotters are, the Hambletonians, Mambrinos, Bashaws, Clays, Stars, Morgans, Black Hawks (a branch of the Morgan family), Gold Dusts, Blue Bulls, Royal Georges, Canadians, etc., besides various other branches of these leading families.

**Progenitors of Trotting Families.**—Although England and America are indebted to Arabia for their finest horses—it being the original source of the pure thoroughbred—careful breeding and training, together with judicious crossing, have produced such a change that the American trotter and the English race-horse of to-day are greatly superior in speed and some other qualities to the best types of the thoroughbred that may now be found.

Youatt says, in this connection:—"The Arabian is not equal to his English descendant. This has also been incontestably proved in the United States. Pure-blood Arabians of the highest pretensions have at various times been imported into our country, but they have never compared either in speed or bottom with the English race-horse and his descendants. A few years ago, Recruit, an English horse of moderate reputation, easily beat Pyramus, the best Arabian on the Bengal side of India."

We see by this the vast field that lies open to the breeder, and the power of intelligent effort in accomplishing desired results. In breeding trotters, more difficulties have been met than in breeding the thoroughbred, since the latter, being of pure blood of long-known value, could be relied upon with a great degree of certainty, while in the case of trotters, which were produced by crossing with the thoroughbred blood, the breeder would frequently be surprised in obtaining the best results from the most unexpected sources, the union of the thoroughbred with other bloods producing in individual cases very different results.

*Messenger*, the noted progenitor of the trotting families in this country, foaled in 1780, had as his first sire Mambrino, second sire Engineer, and third sire Sampson. According to the English stud-book, his first dam was by Turf, second dam by Regulus, third dam by Starling, fourth dam by Fox, fifth dam by Bay Bolton, sixth dam by Duke of Newcastle's Turk, seventh dam by Byerly Turk, eighth dam by Taffolet Barb, and ninth dam by Place's Turk. Beyond Sampson his pedigree may be traced back to Blaze, Flying Childers, and the Darley Arabian. He is described as being gray in color, fifteen and three-fourths hands high, and stoutly built.

*Rysdyck's Hambletonian*, the founder of the Hambletonian family, was got by Abdallah (who was traced to imported Messenger on the side of both sire and dam) out of a dam by imported Bellfounder, with two crosses to imp. Messenger on her dam's side; foaled in 1849.

*Mambrino Chief*, the modern head of the Mambrino family, was foaled in 1844, sired by Mambrino Paymaster, who was a grandson of imp. Messenger.

*Young Bashaw*, foaled in 1822 by Grand Bashaw, an Arabian horse, heads the Bashaw family; his dam was Pearl, by First Consul.

*Henry Clay*, a grandson of Young Bashaw through Andrew Jackson, is the founder of the Clays, which are properly a branch of the Bashaw family.

*Stockholm's American Star*, sired by Duroc, the son of imp. Diomed, is the progenitor of the Star race.

*Justin Morgan*, from whom the noted family of Morgans sprang, was foaled in 1793, sired by a horse named True Briton or Beautiful Bay, and without doubt a thoroughbred. Three of Justin Morgan's sons were famous, and each of them became the progenitor of a long line of descendants of marked and superior characteristics; they were known as Bulrush, Sherman, and Woodbury.

*Bulrush Morgan* was foaled in 1813. He had more muscular development than his brothers, was a dark bay with a few white hairs in the center of the forehead, and no other marks. His legs, mane, and tail were black, his mane and tail being very heavy. His mane is said to have reached nearly to his knees, and his foretop to his nose. His legs were broad, flat, and strong, with a powerful development of muscle. His hips were not as long as Sherman's, and he was not as well quartered as Woodbury, although he was deeper in the chest than either. He had not Woodbury's proud and elegant style of action, although a fine-looking animal. His most remarkable characteristic was his great power of endurance. His dam was a dark bay, weighing a thousand pounds. She was bought out of a six-horse team that carried merchandise between Montpelier and Boston, and was a very strong, hardy animal.

*Sherman Morgan*, foaled in 1808, was a beautiful animal of a bright chestnut color, and possessed most of the fine points of his father. His weight was nine hundred and twenty-five pounds. He had a small white stripe in the face, and his off hind-leg was white from the foot half way to the hock; he also had a fine chest with prominent breast-bone. Although quite spirited, he was very tractable. His descendants were remarkably fine horses of all-work, known as the "general-purpose horse," and had the reputation of being the best stage horses in New England.

*Woodbury Morgan* was superior to his brothers in style of action, and presented so fine an appearance that he was very much sought after as a parade horse. He was very spirited, bold, and resolute. He was foaled in 1816. His dam was a deep bay, with black mane and tail, a small white spot in the forehead, and no other mark. She was of unknown blood, over fifteen hands high, had a fine head and shoulders, compact body, and beautiful mane and tail. Her action was bold and spirited, and she had the reputation of being a fast trotter. The following description of Woodbury is given by Linsley:—

"Woodbury was fourteen and three-fourths hands high, and weighed from nine hundred and eighty-eight pounds to ten hundred and forty pounds; he was weighed several times, and these two statements of his weight, at different times, are the extremes. Many persons who have frequently seen him weighed, say they never knew him weigh more than ten hundred and thirty, nor less than ten hundred and fifteen pounds. He was a dark, rich chestnut; his off hind-leg was white from the foot half way to the hock, and he had a white stripe in his face, beginning at the edge of the upper-lip, filling the space between the nostrils, and extending more than half-way to his eyes.

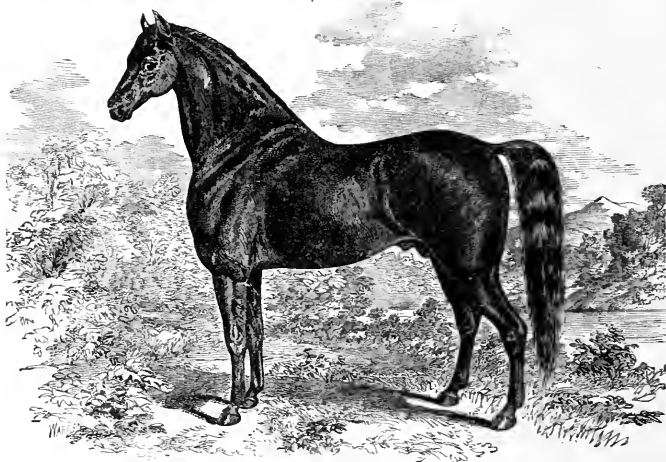
His mane was not very thick or long, and was lighter than either of the others; still it was full. His tail was cut off when a colt, and left about ten inches long; the hair was very full and curly; both mane and tail were about the same color as his body. The hair on the body was fine, short, and soft. He was close and compactly built, with heavy quarters and deep flanks; his chest was good and the shoulders finely shaped; he had a short back, and broad, sinewy loins. His legs had some long hairs on the back side, but were well shaped, somewhat larger than Sherman's and not so large as Bulrush's.

His head was small and lean, with a fine, firm muzzle, the nostrils very large and full, face straight, very wide between the eyes, which were dark hazel, very large and prominent, and showed no white around the edge of the lid. His ears were small and fine, but rather short, and set somewhat wider apart than many would consider consistent with perfect beauty. His style of action was bold and resolute, and his temperament was so nervous

that when taken out with a bridle it was almost impossible to keep him still. He was a good driver and appeared well in harness, but he appeared to the best advantage under the saddle. Militia colonels and generals were eager to ride him, and no 'musters' or reviews could pass without his being seen; in his case, to be seen was to be admired. His disposition was pleasant and playful.

As has been said, he was taken to Gainesville, Alabama, in the autumn of 1836, being then twenty years old. He was shipped from Boston, on board a small sailing vessel; he suffered much from the long and stormy passage, and never fully recovered from the effects of it. It is altogether likely that the climate and food did not agree with him, for neither were such as he had been accustomed to; however this may be, it is certain that he continued to fail until he died in 1838.

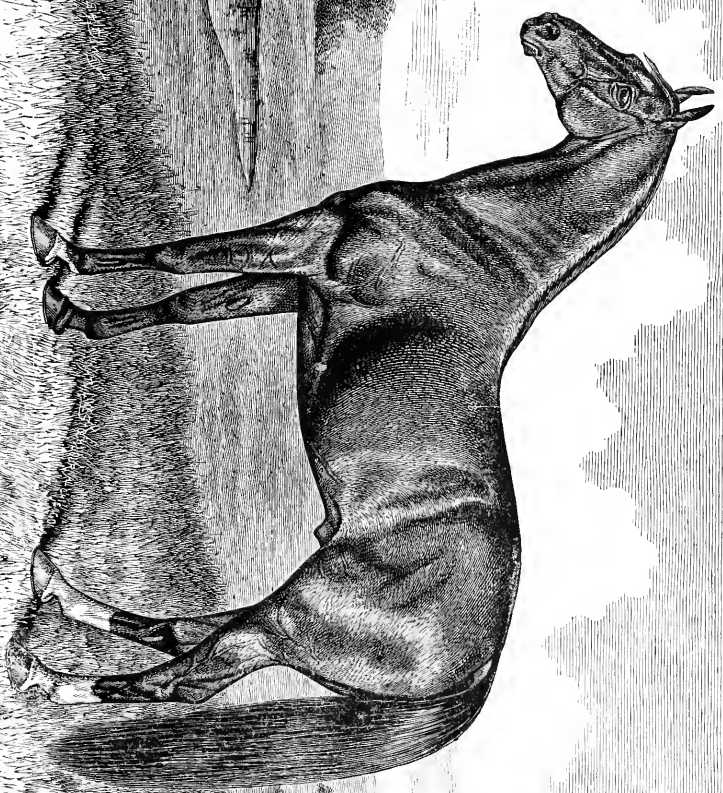
Woodbury was the largest of these horses, and possessed in a greater degree the bold, fearless, and showy style of their sire. He was more nervous and less tractable than Sherman, better under the saddle, not so pleasant in harness, and we are inclined to think hardly



BLACK HAWK.

as good a roadster. His form was more symmetrical than either of the others; his breast was not so full and prominent as Sherman's; he was deeper in the flanks and better quartered. No horse ever had less fear. Martial music only roused him; the firing of guns in no way disturbed him; waving flags and gay uniforms seemed hardly able to attract from him a single glance, and he moved about as if he himself were the principal object of attraction, and the cause of all the attending excitement and display."

*Black Hawk* was sired by Sherman Morgan, the son of old Justin Morgan, the dam being a half-blood English mare of jet-black color, and a fast trotter. From him the race that bears his name are descended, being but another branch of the Morgan family. He was foaled in 1833; was jet-black in color, like his dam, although in almost every other respect he bore a strong resemblance to the family of which he was a member, such as size, compactness, muscular development, temperament, endurance, and style of action. His stock exhibited similar characteristics; though generally larger, they were (when not black) almost without exception a bay, or chestnut. *Black Hawk* was slightly less than fifteen hands high, and weighed 1,000 pounds.



HAMBLETONIAN STALLION "SATELLITE."

Property of Powell Bros., Springboro, Pa.



In writing of him when he was twenty-three years of age, Mr. Linsley says: — "His compact, symmetrical, and muscular form, and nervous, elastic style of action, give unmistakable evidence of the speed and endurance he has shown upon the turf and road; and although now twenty-three years old, his eye has lost none of its brightness, his health is still excellent, and his movements still graceful and energetic."

He was in all respects a remarkable horse, being beautiful and majestic in appearance, and whether in harness or not, he was ever the same splendid animal, always attracting universal admiration. His blood is very highly prized in New England trotting circles of to-day, as well as other portions of the country. He could trot his mile in 2:40 without training, and was a horse of great intelligence, as well as great endurance. Besides, Black Hawk possessed the power of transmitting his speed and other characteristics to his offspring in a degree unsurpassed by any horse in the country. He died in 1856, being twenty-three years old.

*Gold Dust* was another branch of the Morgan family of horses, while the Royal Georges sprung from Tippoo, a horse supposed to be from Ogden's Messenger, a son of imported Messenger.

The best representatives of the Canadian race are said to be St. Lawrence and Pacing Pilot, horses of unknown pedigree. Besides these, are the Blue Bulls, which were descended from Doyle's Blue Bull, a pacer that was sired by a pacer of the same name, and numerous other branches of leading families already given. Various opinions are entertained by different breeders, relative to the best methods of perpetuating and improving the trotting horse, but our limits will not admit of farther consideration of the subject in this connection.

Fabulous prices have been paid in this country for trotters, and frequently for colts, simply on the strength of their breeding. It is stated from authentic sources that in 1876 the sum of \$13,000 was paid for two two-year-old fillies, and \$41,200 for thirteen, nearly all of them young. A three-year-old colt, Steinway, was sold in 1879 for \$13,000 to a party in California. Gov. Sprague was sold for \$27,000 at the age of five years, and Maud S. for \$21,000 when four years old, and after she had trotted a mile in 2m. 17½s. As she is now queen of the turf, having reduced her record to 2m. 10½s., it would probably require a very much larger sum than that to purchase her, if at all. The sum of \$40,000 was paid for Smuggler, \$45,000 for Pocahontas, \$35,000 for Goldsmith Maid and Dexter, \$36,000 for Rarus, \$30,000 for Lady Thorne, while St. Julien was prized at \$50,000 at the close of 1879, when he had attained the fastest record known at that time. Messenger, Rysdyk's Hambletonian, Volunteer, and several other noted horses were valued at \$100,000 when in their prime.

**Noted Trotting Horses.** — Among the many noted trotting horses of the country, we have space to give the description of but a few. Trotting time has been gradually reduced until at present it stands at 2m. 10½s., that achieved by the queen of the turf, Maud S, whose record has not yet been excelled. Trotting a mile in three minutes was formerly considered very good time, while the opinion entertained by many of the leading horsemen of the country of former days was, that no animal could ever excel the 2m. 20s. record, and when little Flora Temple, less than twenty-five years ago, reduced it to 2:19¾, she became the wonder of the world for a brief time. Dexter, after a period of eight years, reduced this record to 2:17½. In 1871 Goldsmith Maid reduced this record to 2:17, and again in 1873 to 2:16¾. She still continued to reduce her record by degrees, until it reached 2:14, remaining queen of the turf until Rarus comes to the front with a record of 2:13¼. But his reign is short, for from California the following year comes the news that St. Julien has won a victory over time by a record of 2:12¾. The contest next is between Maud S. and St. Julien, at Rochester, N. Y., in August, 1880, which resulted in a drawn battle for possession of the sceptre, but a joint victory over time, for they each scored on that day a record of 2:11¾. This was still further reduced afterward by St. Julien to 2:11¼, and by Maud S. to 2:10¼.

Among the best-informed horsemen there is a diversity of opinion with respect to the limits of trotting speed, but none fix it slower than '2m. 10s., while some are confident that a mile will yet be made by a trotter in two minutes. The pacing gait differs from trotting by having the front and hind legs on the same side move in the same direction simultaneously, while in trotting, the near fore-leg and off hind-leg move together. The pacing gait is more rapid than trotting, but the latter is greatly preferred.

**Flora Temple** was foaled in 1845, and bred by Samuel Welch, Esq., of Oneida county, N. Y. She was sired by Hunter, who was by Kentucky Hunter, her dam being Madam Temple, who was sired by a spotted Arabian horse owned by Mr. Horace Terry of Dutchess county, N. Y. She was purchased of a drover by Mr. Jonathan Vielee for \$175. At this time she was a little rough-coated animal, not over fourteen hands and two inches high, and was tied behind the drover's wagon by a rope. All that the drover would tell Mr. Vielee about the little bay mare with a docked tail was, that he had purchased her in Utica of a young man who had been trying in vain to dispose of her in connection with another little mare, but that the intractable disposition of this one had invariably prevented a sale, so that finally each animal was sold separately, and Flora, at five years of age, was bought by the drover for \$80.

It appears, also, that her former owner kept her until she was four years old, and, finding her willful and unserviceable, sold her for the sum of \$13. Mr. Congdon, her new owner, sold her soon after for \$68, subsequent to which she changed owners two or three times before coming to Mr. Vielee, who, fortunately, was a man who appreciated, to a certain extent, her good points. Being a practical business man, and sufficiently sagacious to see that New York was a place to find a market for such an animal, Mr. Vielee took her there and sold her to Mr. Geo. E. Perrin of that city for \$350. In his hands she was instructed in trotting and fitted for the track. Her first public appearance upon the turf was at Long Island in 1850, when, to the astonishment of all, she defeated four horses, winning the purse of \$50, and the race in 2:52, 2:55, 2:52, 2:49.

The next year she was not in training, owing to an accident. The following year she trotted twice, winning both times. In 1853, being then eight years old, she started a wonderful trotting career, which ended only with the advent of the civil war.

In her first race at the old Hunting Park Course, Philadelphia, she was beaten by Black Douglass, a local celebrity, but soon made him lower his colors by defeating him twice without difficulty. She also beat Highland Maid twice, Green Mountain Maid three times, Tacony seven times, Rhode Island three times, and Lady Brooks and Lady Vernon each once. She was beaten twice by Tacony, and once each by Black Douglass and Green Mountain Maid. In her first season upon the turf it will thus be seen that she won nineteen races and lost but four. In her next season she lost in her first race with the gray mare, Sontag, and won in every race besides during the whole season.

In the next two years, she carried off the lion's share of the honors, and reduced her record to 2:24½. In 1858 she was sold to Wm. McDonald, Esq., a wealthy gentleman of Baltimore, for \$8,000, and during the year won thirteen victories, without a single defeat. The next year (1859) was a remarkable year with her, not only for winning in her races with Ethan Allen, beating him twice, and also in other races, but especially for her splendid record of 2:19¾, at Kalamazoo, Michigan, October 15th.

In the many races trotted by little Flora Temple during the rest of her trotting career, her most formidable antagonists were George M. Patchen and Ethan Allen; the former defeating her in one two-mile heat contest, and Flora defeating him twice, and Ethan Allen once. She also went hippodroming with George M. Patchen. Her owner sympathizing with the rebellion, she was confiscated by the governor in 1861, and never trotted again.

In 1864, Flora Temple was purchased by Mr. Welch of Chestnut Hill, Pa., for the sum

of \$8,000. Mr. Welch owned her up to the time of her death of old age, which occurred Dec. 21, 1877, aged nearly 33 years.

**American Girl.**—This noted animal was a bay, about sixteen hands high, was foaled in 1862, by an unknown mare who was bought for forty dollars from a team in Virginia. She was sired by Amos Clay and bred by Mr. Philip Travis of Westchester County, New York.

Mr. Travis gave the filly to his sons; and they, not seeing her value, sold her for a small sum to a Mr. Odell, who, after testing her value as a roadster, and finding her speedy, disposed of her to Messrs. Travis and Mason, brick-makers, near Peekskill.

The mare now received her name, "American Girl," and was put in training for the trotting-course with a horse known as J. J. Bradley, in the first of which she was to go in wagon, he in harness; in the second, both were to go in harness. The first race occurred on the 15th of November, 1867, and was well contested by American Girl, now five years old, but was won by the horse. The second race, being on even terms, was never trotted, the owner of the gelding paying forfeit.

American Girl was now sold to Mr. William Lovell, and was placed in the hands of John Lovett as trainer, and on the 4th of June, 1868, she beat Goldsmith Maid at Poughkeepsie, after a desperate race of six heats, the first of a series of races in which these renowned mares were rival contestants. In one of the heats of this race, American Girl trotted in 2:28. She showed also that she had remarkable courage and resolution.

Losing in the next race at Narragansett Park, Mr. Lovell selected for her a new driver and trainer, Mr. Hiram Howe. Soon after, there was another trot between American Girl and Goldsmith Maid, in which the former defeated the latter after a contest of six heats, the best time being 2:25. American Girl trotted in five other races during the season, winning twice and losing three races. She, however, gained a record of 2:24. After three defeats in the following season, she was placed in the hands of Roden, a man of excellent capacity.

Roden began with her on the 29th of May, 1869, at the Prospect Park course, and had to compete against a large and very strong field, consisting of Lucy, Bashaw, Jr., Goldsmith Maid, Rhode Island, and George Wilkes. In this race she won in three straight heats—2:23½, 2:23¼, 2:21.

This was not only a grand triumph for her, but also shows how much depends upon a driver of the right kind and capacity. This was the first time that this remarkable mare, now in her seventh year, had been properly handled; hence, the result.

In the six ensuing races of the season, she won in every instance; and in one of these races (notably that on the 26th of June) at Narragansett Park, placed herself second on the roll with Dexter, by beating Lady Thorn, Goldsmith Maid, Lucy, and George Palmer, in three straight heats, and also getting a record of 2:19.

But at Suffolk Park, Philadelphia, American Girl met Goldsmith Maid for the sixth time and was beaten. Following this defeat, another driver took her in charge, but, as will be seen, he was the wrong man in the wrong place; for in the balance of the season he won but three races, while he lost seven. In his hands also, in 1870, she won seven races and lost in nine. In 1870 American Girl did not beat Goldsmith Maid once, but was beaten by the latter seven times. During the season of 1871, she won in six races; none of them very fast, and lost in seven, being beaten six times by Goldsmith Maid.

In 1872, she was placed in the hands of Mr. Mace, and began the season by winning the first three races. In the third race, American Girl met and defeated Goldsmith Maid, Lucy, and Henry, in three heats—the second heat being trotted in 2:19¼. During this year, she won in all eight races, and in one of them with Lucy, in which she lost, made the time of 2:17¼. The following year she won five races. In 1874, she won in nine races, the best and crowning one in her career being at Albany, when she made the time of 2:20¼, 2:16¼.

2:19, placing the three heats on the average at 2:18½ each, the result being all the more remarkable when we remember that she was badly spavined in one leg.

In 1875 she won only one race, when she beat Lula and Nettie, her remarkable career closing at Elmira, New York, October 2d, where she dropped dead at the quarter-pole in the first heat. She had been ailing with epizootic, and, as the post-mortem showed, ought not to have been put upon the race-course in that condition.

**Goldsmith Maid** was foaled in 1857. Her sire was the son of Hambletonian, known in Kentucky as Alexander's Abdallah. Her dam was by the original Abdallah, son of Mambrino (Americus) and sire of Hambletonian. She is said to have been "the smallest of her dam's products, and was by no means exempt from temper and accidents." She was noted for jumping fences, and when put to the harrow, was entirely unmanageable, as she would rear up and fall over; when hitched to a wagon, she would kick herself loose and run away. She was regarded as so very ungovernable as to be practically useless, and her owner, Mr. J. B. Decker, of Sussex County, New York, accordingly sold her for the sum of \$350. In taking the animal home, the purchaser was offered \$400 for her, which he accepted. Three months later the last purchaser sold her for \$650 and a buggy to Mr. Alden Goldsmith, one of the most sagacious, kind, and patient of horsemen. She was at that time very wild, timid, and unruly, although she possessed nothing of what might be termed a malicious disposition. By patient and gentle treatment, Mr. Goldsmith made her more quiet, but she would not go with check-rein or running-martingale, so her owner ordered them taken off, and also took off her blinders. She trotted without check in all her races for the first three years. She is described as "small of stature, long and low, deep through the heart, of wiry, whalebone texture all over, and with a back of amazing strength for a horse of her size."

In 1865 she trotted her first race, the best time being 2:26, and won in three heats. In 1866 she trotted nine or ten times, and won in all but the last. The next year she was beaten by Dexter. In 1868 she won eight times and made a record of 2:21½. The next season she lost five times to the American Girl, who trotted in 2:19. Her next record was 2:20½ at Boston, where she beat Lucy. At Philadelphia she won the victory over American Girl in three heats all better than 2:20, which was the first time any horse had beaten 2:20 in all the heats of a race.

During this year she won eight races, beating all those that had previously beaten her except Lady Thorne. In 1870 she won eleven times. In 1871 she beat all her competitors, including American Girl and Lucy. Soon after, she trotted in 2:17, beating Dexter's time of 2:17½. In 1872 she went to Boston and reduced her record to 2:16¾. After this she put in all the heats for the fourth time in less than 2:20. She was then taken to Sacramento and in little more than a month after her previous race trotted in 2:17½. In 1874 Goldsmith Maid trotted seventeen times and with increased speed, making a record of 2:16. Three times during this year 2:20 was beaten in all the heats. At Rochester a second heat was trotted in 2:14¾. At Boston in September, 1874, she trotted in 2:14. In 1877 she defeated Rarus in California over a rough track in 2:19½, 2:14½, 2:17. Shortly after this she was permanently retired from the track, her best record, as previously stated, being 2:14.

The following incident, showing how attached an intelligent horse becomes to his faithful attendant, and also the influence of kindness on dumb animals, will be of interest to many. As the story goes, Charley Cochrane, who was many years the faithful custodian of Goldsmith Maid, went to pay her a visit. It is well known that she was very jealous of her foal, and would not permit any one to come near it, and it was arranged that she should hear Charley's voice before she saw him; and although they had been separated for two years, a loud whinny presently assured the visitors that she had recognized the man's voice. Cochrane next showed himself, when a touching scene occurred. The old Queen of

the Turf, who for months would not allow any one to approach her, making use of both heels and teeth if it was attempted, rushed with a bound to her old friend, forgetting even her colt, and rubbed her head upon his shoulders, her nose in his face, played with his whiskers, and showed by her every action that her heart was full of joy to see him. Directly the colt came up to them, and she seemed delighted when Charley placed his hand on the little fellow. When Cochrane left the place she followed him to the gate, whinnying for him even after he had passed out of her sight. This horse is only one of many examples that might be given of what patience and kindness will accomplish with a high-tempered and spirited horse.

**Dexter** was bred by Jonathan Hawkins, Esq., of Orange county, N. Y. He was foaled in 1858, and purchased when four years old by Mr. George B. Alley for the sum of \$400. He was sired by Hambletonian, and, although a finely-formed animal, his four white stockings and blaze in the face had caused him to be held in disfavor; so that up to this time it is stated that he was not only practically unbroken, but had never had a feed of oats in his life.

In his early training, while in Mr. Alley's hands, two accidents happened, one while he was attached to a sleigh, and the other to a wagon, resulting in each case in a runaway. Fortunately, in his five-year-old season he was placed in the hands of Hiram Woodruff, and after a short time went in 2:42 to a wagon. Dexter made his first trot on the 4th of May, 1864, and was consequently six years old at the time. In this effort his competitors were beaten.

He continued to improve his record until it was reduced to 2:17 $\frac{1}{4}$ , being repeatedly matched with the best trotters of the country. After this achievement he was purchased by Mr. Bonner and retired from the turf. *Wallace's Monthly* says of him :

"During his career of less than four seasons, Dexter won forty-nine races. The great majority of them were mile heats, three in five, in harness. He also won at three-mile heats, and at two-mile heats, in harness, and to wagon he was never defeated. He lost a race to Shark through hitting himself. Lady Thorne defeated him once when he was not seasoned, and was off, as well. He beat her five times in much better races. General Butler beat him once in a poor race, under saddle, when he was off. Ethan Allen, with running mate, beat him twice. Dexter made the best mile under saddle, the best mile in harness, and the best mile to wagon that had been made. His two miles to wagon, second heat, was perhaps his greatest performance."

**Rarus.**—Of the pedigree of this horse, which was for a brief period king of the turf, there seems to be a mingling of fact and speculation. Mr. Conklin, who bred him, states that his sire was a horse owned by him called Abdallah (the son of old Abdallah). Others trace his pedigree to Rysdyk's Hambletonian, and those who knew the latter horse well see a striking resemblance between him and that famous progenitor of a family of trotters. Mr. Videto, one of his former owners, says he was "marked like the 'old horse,' gaited like him, and formed like him, with the same sway back and white hind-feet."

The investigations which have been made also establish the fact that the dam of Rarus was by Telegraph, and that his grandam was a good mare that was *known* as a Black Hawk, but farther than this nothing is known of her; from all of which it would seem that the pedigree of Rarus through Conklin's Abdallah is uncertain: and it should be written as unknown.

But a horse that can beat the time of the famous Goldsmith Maid, and win a record of 2:13 $\frac{1}{4}$  as Rarus did, at Buffalo Park, is a kingly horse indeed, and deserving of all the more credit for all his brilliant performances, if he does not inherit speed from his ancestors.

He was a large, strong horse, of an exceedingly unpleasant disposition, and would frequently manifest his temper by both biting and kicking. He was used in the streets of New York for some time, in a butcher's cart, but took a higher position when his real merits became known and appreciated.

In appearance, Rarus was a fine-looking animal. He was a bay, with white hocks, and a white strip on the nose; was  $16\frac{1}{2}$  hands high, and in many respects resembled Rysdyk's Hambletonian. Rarus's fastest first heat was at Cleveland, Ohio, in 1878, and was  $2:14\frac{1}{2}$ ; his fastest second heat was in Hartford, Conn., the same year, and was  $2:13\frac{1}{2}$ . His fastest third heat was also in the same year at Buffalo, N. Y., the time being  $2:13\frac{1}{4}$ .

**Smuggler.**—This horse was bred by Mr. J. M. Morgan, who at that time resided near Columbus, Ohio. He was foaled in 1866, and was taken to Olathe, Kansas, in August, 1872, and at that time is said to have been a confirmed pacer. He was soon after placed in the hands of a very successful trainer and driver, and in about three months made a mile in  $2:30$ . From this time his improvement was very rapid. In July, 1873, he made the time of  $2:18\frac{3}{4}$ . He was soon after purchased by Col. Tuffits, of Kansas, and shortly after this taken to Prospect Park, N. Y., and given a public trial of three heats, one mile each, which resulted in the time of  $2:19\frac{3}{4}$ ,  $2:21\frac{1}{4}$ ,  $2:21$ , making the last half of the third mile in  $1:09$ : Immediately after this performance, he was purchased by Col. H. S. Russell, of Milton, Mass., for the sum of \$40,000. He continued to gradually lower his record, and at Rochester, N. Y., 1876, he won in three straight heats, in  $2:15\frac{3}{4}$ ,  $2:18$ ,  $2:19\frac{1}{2}$ , making a record four and a quarter seconds lower than had ever been made by any other stallion. At Hartford, Conn., the same year, he trotted in  $2:15\frac{1}{4}$ , the fastest heat ever made by a stallion.

Smuggler is a very dark bay horse,  $15\frac{3}{4}$  hands high, with a blaze lying between the eyes, and widening out until at the end of his nose it extends to either nostril. Like almost all pacers that have been broken to trotting, he wears a heavy shoe in front in order to steady his gait. Of his pedigree, one of the leading stock journals says:

"He was got by Blanco, a son of Iron's Cadmus, and his dam was a bay pacing mare brought from West Virginia. This mare was for a long time reported as by Tuckahoe, but subsequent investigations have exploded that story, and it may safely be said that her blood is hopelessly unknown. The dam of Blanco was by blind Tuckahoe, a son of Herod Tuckahoe. Iron's Cadmus was by Cadmus, son of American Eclipse, out of a mare by Brunswick. This horse, Iron's Cadmus, was the sire of the famous pacing mare Pocahontas, who, in turn, was the dam of Mr. Bonner's trotting mare of the same name, by Ethan Allen.

It will be seen from the foregoing that all that is known of the blood of Smuggler is through his sire, Blanco, and that from this source he inherits a good share of pacing blood, mixed with thoroughbred; and that his dam was also a pacer."

**St. Julien.**—This regal horse, the rival of Maud S., was bred by Mr. Benj. F. Dunning, of Orange county, N. Y. He was foaled in 1869, sired by Volunteer, who was sired by Hambletonian got by Abdallah, while his dam was by Henry Clay. He is a large, powerfully-built animal, and possesses great courage and energy.

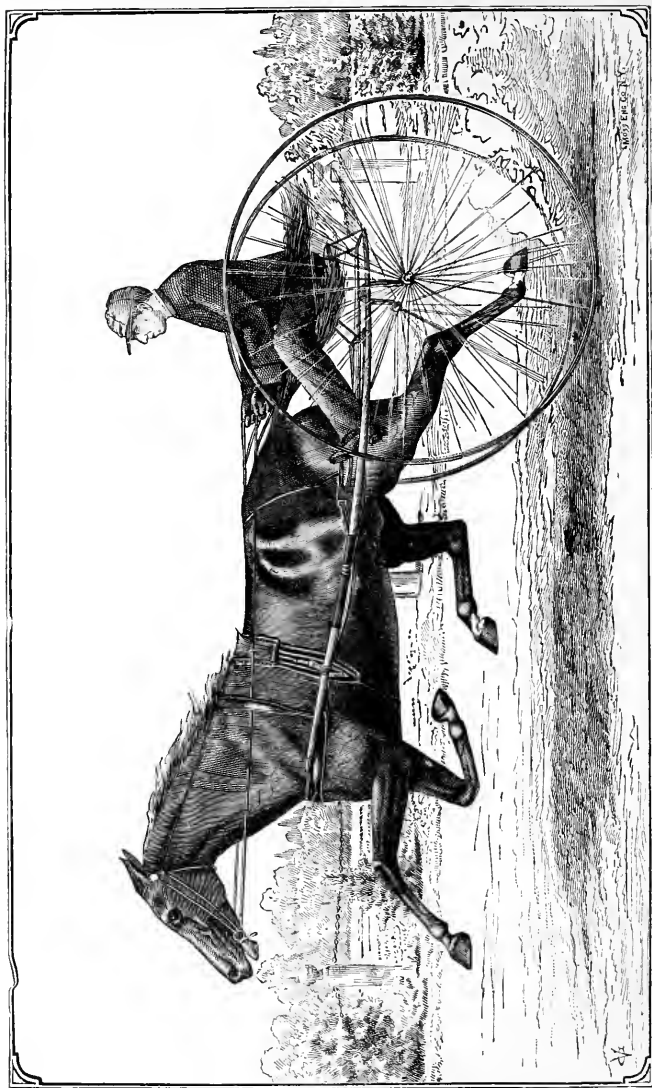
He made his entry into the trotting world at Poughkeepsie, N. Y., in August, 1875, and in the short space of three weeks *won six races*. He was sold in January, 1876, to California parties for the round sum of \$20,000, and was taken at once to that State, where for three years he was out of condition much of the time. His training during this period, however, was as skillful as it was severe, as his subsequent achievements attest.

His fastest record up to the present time is  $2:11\frac{1}{4}$ , being next to Maud S., who stands first, being the fastest trotter known to the turf.

**Maud S.**—This noted horse, at present queen of the trotting turf, was bred at Mr. Alexander's celebrated "Woodburn Farm." Her sire was Harold, a son of Rysdyk's Hambletonian, whose dam was Enchantress, got by Abdallah. Her dam was Helen Russell, by Pilot, Jr., son of old Pacing Pilot.

It will be remembered that Maud S. showed  $2:17\frac{1}{2}$  at a public trial, when four years old, at Lexington, Ky., Oct. 26, 1878; and that thereupon Mr. Wm. H. Vanderbilt, of New York, purchased her for \$21,000.





"JAY EYE SEE." Time 2:10.  
Owned by J. I. Case, Racine, Wis.

It seems, however, that during the year that Maud S. remained in New York she did not come quite up to Mr. Vanderbilt's expectations, so with his characteristic good sense he sent her back to Capt. Stone, of Cincinnati, the gentleman of whom he bought her, with the request that he would take her in hand and bring her back to her old form.

Upon receiving Maud S. Capt. Stone put her under the charge of her former trainer, in whose hands she rapidly improved, and soon the most remarkable accounts respecting her speed were afloat. She is described as follows:

"Maud S. the champion trotter of the world, is a long-bodied mare, standing 15 hands  $2\frac{1}{2}$  inches high at the withers and fully 16 hands high at the hips. Her weight, in trotting condition, is 960 lbs., and her stride, when going at her best, on a straight track, is about 18 feet. In her great feat at Chicago, September 18th, when she trotted a mile in  $2:10\frac{3}{4}$ , her stride, when coming down the home stretch against a high wind, was a little less than 17 feet. She wears 'slin boots' and 'scalpers,' and carries a 15-oz. shoe, with a 4-oz. toe-weight in front, and an 8-oz. shoe behind. She is usually driven in a bridle, without blinds. She is a mare of very strong will, and it is necessary to handle her with great gentleness. A man who would fight her, would soon render her entirely unmanageable. And in this she is the counterpart of her grandam Enchantress, as well as of her sire Harold and his full brother Lakeland Abdallah. The old mare had the courage and resolution of the bull-dog, and this quality descended to all of her produce. Harold and Lakeland Abdallah both possess it to a remarkable degree, and, if they had fallen when young into gentle, careful hands, as Maud S. fortunately did, it is certain that they would have developed into animals of far greater value even than they proved to be."

When brought out for a race, Maud S. is as steady as a clock, and moves with that easy, gliding motion which steals over the ground at a pace that deceives everything but the timer's watch. This gives her a great advantage over horses of nervous and excitable temperaments. The account of her best achievement is thus given by one of the journals of the day:—

"Twenty thousand people gathered at the race-course at Buffalo, N. Y., August 11th, to witness an attempt to lower the record of the noted mare, Maud S. She was accompanied by a running horse who could not keep up with her, the track being in perfect condition for trotting. Maud S. trotted the first quarter in  $32\frac{3}{4}$ , the half in  $1:05\frac{1}{4}$ , the three-quarters in  $1:37\frac{1}{2}$ , and the full mile in  $2:10\frac{1}{4}$ . This is the fastest time ever made, and the race was made under the eye of her owner, Wm. H. Vanderbilt, and at his desire. Last year she closed the season with a record of  $2:10\frac{3}{4}$ ; at Pittsburgh, Pa., a few days ago, she made a mile in  $2:10\frac{1}{2}$ , and has now still farther reduced her record. Her driver expects to see her make a mile in  $2:08$ ."

**Santa Claus.**—This famous animal belongs to the Hambletonian family, being the son of Strathmore, a grandson of Rysdyk's Hambletonian, a great grandson of Abdallah. His dam, Lady Thorne, Jr., was by Williams' Mambrino, a grandson of Mambrino Chief. In color, Santa Claus is a dark bay, with black mane, tail, and legs, while his fore-top reaches nearly to his nostrils, and conceals a small star in the forehead, the only white there is on him. He has a well-formed chest and body, and limbs admirably adapted to speed. It is stated that when first foaled he was so ill-formed and ungainly that the owner of his sire endeavored to hire the breeder of the colt to kill him, whose proposition came near being accepted. This valuable animal is at present owned by Col. P. A. Finigan of California. His best time thus far is  $2:17\frac{1}{2}$ , a record that will probably be reduced in the future, as he is now in his prime, and possesses great endurance and energy.

**Gov. Sprague** is a coal-black stallion, without a white hair, but his muzzle and flanks show wine-colored tints. He is slightly taller at the withers than at the rump, with a short back, powerfully muscled, and limbs sinewy and strong. He possesses great endurance, as

is evidenced by his conformation generally, while he is energetic and courageous, yet gentle and kind in disposition. He was foaled in 1871. His sire, Rhode Island, belonged to the Messenger family, and had a record of 2:23 $\frac{1}{2}$ , while his dam also possessed thoroughbred blood. During the summer that he was two years old he was broken to the harness, and showed such remarkable promise of speed that he was sold in the autumn to Messrs. Higbie Brothers and Mr. A. C. Babcock of Canton, Ill., for \$1,500. For the next year he was driven but little on the road, and this only with a view to accustom him to the harness; but he was not put to training. In the spring of 1875 he was put to moderate training, but not driven to his full speed. In the spring of 1876 he was again put in training. In the following June he was sold to his present owner, Hon. J. I. Case of Racine, Wis., for \$27,000. Two weeks afterward he won his second race at Rochester, N. Y., and made a record of 2:21 $\frac{1}{4}$ . Shortly afterward he reduced his record to 2:20 $\frac{1}{4}$ , being then five years of age.

As a sire of trotters, he has already become noted. Kate Sprague, of his get, a six-year-old mare, made 2:18 in the second heat, at Rochester, N. Y., in 1881, trotting the last quarter of the heat in 33 $\frac{3}{4}$  seconds; a 2:15 gait.

**Trinket.**—This horse was bred by R. S. Veach, Esq., of "Indian Hill Farm," near Louisville, Ky. She was sired by Princess in 1875, who was sired by the famous and fast-trotting stallion Woodford Mambrino, he by Mambrino Chief. The dam of Princess was by Alexander's Abdallah, a son of Rysdyk's Hambletonian. The dam of Trinket was also by Rysdyk's Hambletonian. Thus it will be seen that she possesses a trotting pedigree, built largely upon a thoroughbred foundation. Her owner sold her when a yearling. When two years old, she showed great speed for her age. Her first appearance upon the turf was in 1879. She is described by one of the leading journals as follows:—

"A handsome, high-bred-looking mare, with a fine, intelligent head, a light, well-shaped neck, and splendid shoulders, with great heart-room, a strong back, well-coupled, wide hips, and sloping quarters and big stifles—a union of great substance along with quality. Her appearance is suggestive of the whalebone, spring-steel style of horse. Her legs are hard, like ivory, and she has not a soft spot about her. A dangerous, resolute-looking mare is Trinket, and when she moves, her action is smooth, frictionless, and stealthy. She covers a vast amount of ground at a stride, but she does it seemingly with a cat-like effort; and when she gets the word 'Go!' she darts as a cat darts from under the bed with a dog to persuade her. She is about 15 $\frac{1}{2}$  hands high, and wears an eight-ounce toe-weight when trotting." Her best record, up to this time, is 2:14 $\frac{3}{4}$ .

**Thorndale** is a bay stallion 15 $\frac{1}{2}$  hands high, and foaled in 1865. He was bred by Dr. J. R. Adams of Scott county, Ky., and is owned by Edwin Thorne of "Thorndale Stud Farm," Millbrook, N. Y. He was sired by Alexander's Abdallah, the sire of Goldsmith Maid, for a long time queen of the trotting turf; her record, as previously stated, being 2:14. His first dam was Dolly, by Mambrino Chief, the sire of Lady Thorne, whose record was 2:18 $\frac{1}{4}$ . His second dam was by a son of Potomac.

Thorndale won the three-year-old trotting stakes at Lexington, Ky., July, 1868, in three straight heats, the record being 2:49 $\frac{1}{4}$ , 2:50, 2:55. Immediately after this race, he was purchased by Mr. Thorne, and placed at the head of his stud. He was awarded the first premium in the stallion class, three years old and under five, with ten competitors, at the Narragansett Park Fair, 1868. He also won the first premium in the stallion class for getting roadsters, at the New York State Fairs at Albany in 1871, 1873, and 1880.

In May, 1876, he was placed in the hands of his trainer, and after eighty days' training he trotted in Buffalo with eleven competitors in the 2:32 class, and won the second, third, and fifth heats, and the race in 2:22 $\frac{1}{4}$ , 2:23 $\frac{1}{4}$ , and 2:25. Since that period he has won in several races, in one of which at Fleetwood Park, N. Y., he won not only the race, but a prize of \$2,000 and a silver cup.

**Trotting Record.**—The following is a list of horses that have trotted a mile in 2m. 20s., or better, together with their pedigree; also, tables of the fastest trotting to wagon, under saddle, pacing different distances, fleetest running, etc.

- 2:09¾.  
Maud S., by Harold, dam Miss Russell, by Pilot, Jr.  
2:10.  
Jay-Eye-See, by Dictator, dam by Pilot, Jr.  
2:11¾.  
St. Julien, by Volunteer, dam by Harry Clay.  
2:13¾.  
Rams, by Conklin's Abdallah, dam by Telegraph.  
2:13¾.  
Phallas, by Dictator, dam by Clark Chief. (The fastest time by a stallion.)  
2:14.  
Goldsmith Maid, by Alexander's Abdallah, dam by Abdallah.  
Trinket, by Princeps, dam by Rysdyk's Hambletonian.  
Clingstone, by Rysdyk, dam Gretchen by Chosroes.  
2:14¾.  
Hopeful, by Godfrey's Patchen, dam by Bridham Horse.  
2:15.  
Lulu, by Alexander's Norman, dam by imp. Hooten.  
2:15¾.  
Smuggler, by Blanco, son of Iron's Cadmus, dam unknown.  
2:15¾.  
Hattie Woodward, by Aberdeen, dam by Henry Clay.  
2:16¾.  
Lucille Golddust, by Golddust, dam by Bald Hornet.  
2:16¾.  
American Girl, by Amos's C. M. Clay, dam unknown.  
Darby, by Delmonico, dam by Cox's Stump-the-Dealer.  
Edwin Thorne, by Thorndale, dam by Lady Lightfoot by Ashland.  
2:16¾.  
Charley Ford, by McKisson's Grey Eagle, dam unknown.  
Occident, by Doc, son of the pacer St. Clair, dam unknown.  
2:17.  
Gloster, by Volunteer, dam by Stockbridge Chief.  
2:17¾.  
Dexter, by Hambletonian, dam by American Star.  
Piedmont, by Almont, dam by Mag Ferguson by Mambrino Chief.  
So-So, by George Wilkes, dam by Edwin Forrest.  
2:17¾.  
Santa Claus, by Strathmore, dam by Lady Thorne, Jr., by Williams's Mambrino.  
2:17¾.  
Hannis, by Mambrino Pilot, dam a Morgan Mare.  
2:18.  
Dick Swiveller, by Walkill Chief, dam by Harry Clay.  
Edwin Forrest, by Brannock's Ned Forrest, dam by Smiling Tom.  
Great Eastern, by Walkill Chief, dam by son of imp. Constellation.  
Josephus, by Green's Bashaw, dam by Copperbottom (?).  
Judge Fullerton, by Edward Everett, dam unknown.  
Kate Sprague, by Gov. Sprague, dam Fan by Lance.  
Nettie, by Hambletonian, dam by American Star.  
Proteine, by Blackwood, dam by Mambrino Chorister.  
Red Cloud, by Legal Tender, dam unknown.  
Robert McGregor, by Major Edsall, dam by Seely's American Star.  
Jerome Eddy, by Louis Napoleon.  
2:18¾.  
Lady Maud, by Gen. Knox, dam unknown.  
Lady Thorne, by Mambrino Chief, dam by Gano.  
Lucy, by Geo. M. Patchen, dam by May Day.  
Midnight, by Peacemaker, dam by son of Hiram Drew.  
Monroe Chief, by Jim Monroe, son of Alexander's Abdallah, dam by Bay Chief.  
2:18¾.  
Col. Lewis, by Rifleman, dam unknown.  
Slow-Go, by Young Shantuck, grandson of Medoc, dam unknown.  
2:18¾.  
J. B. Thomas, by Sterling, he by Patchen Boy, a son of Godfrey's Patchen, dam unknown.  
Nutwood, by Belmont, dam by Pilot, Jr.  
Patchen, (breeding unknown).  
2:19.  
Albemarle, by Tom Hunter, dam by Blucher.  
Alexander (France's), by Ben Patchen, dam by Canada Jack.  
Alley, by Volunteer, dam by New York Black Hawk.  
Bonesetter, by Brooks, son of Brown Pilot, dam by Adams's Stump-the-Dealer.  
Cozette, by Blumberg's Black Bashaw, dam by Stargazer.  
Edward, by Fisk's Hambletonian Star, dam unknown.  
Graves, by Whipple's Hambletonian, dam unknown.  
Kitty Bates, by Loder's Cloud Mambrino, dam unknown.  
Wedgewood, by Belmont, dam by Woodford.  
2:19¾.  
Bodine, by Volunteer, dam by Harry Clay.  
Comet, by Daniel Lambert, dam by Hiawatha.  
Crocie, by Clark Chief, dam by Little Priam.  
George Palmer, by Ames's Bogus, dam unknown.  
Keene Jim, by Keene's Lookout, son of Bourbon Chief, dam by Morgan Rattler.  
Parana, by Mambrino Hambletonian, dam Belle of Cayuga, by Hambletonian Prince.  
2:19¾.  
Driver, by Volunteer, dam by American Star.  
Moose, by Washburn Horse, dam unknown.  
Thos. L. Young, by Yellow Jacket, dam by Dragon.  
Troubadour, by Revenge, dam Illinois Maid by Black Slasher.  
Will Cody, by Blue Bull, dam unknown.  
Aldine, by Almont.  
2:19¾.  
Adelaide, by Phil. Sheridan, dam by Sam Houston, son of Vermont Black Hawk.  
Camors, by Gen. Knox, dam unknown.  
Dalsydale, by Thorndale, dam by Burr's Washington.  
Deck Wright, by Hindsdale Horse, dam unknown.  
Fanny Witherspoon, by Almont, dam by Gough's Wagoner.  
Flora Temple, by Loomis's Bogus, dam by a spotted Arabian.  
John S. Clark, by Thomas Jefferson, dam by Scott's Hiawatha.  
2:20.  
Annie W., by Almont, Jr., dam Belle Forrest.  
Belle Brasfield, by Viley's Cripple, dam by Mambrino Chorister.  
Capt. Emmons, by Continental, dam by John Morgan.  
Elaine, by Messenger Duroc, dam by Harry Clay.  
Etta Jones, by Parrish's Pilot, dam by Pilot, Jr.  
Fleety Golddust, by Golddust, dam Tiger Morgan.  
Frank, by Buel's Pathfinder, dam unknown.  
Humboldt, by Stocking Chief, dam by Parrish's Crockett.  
John H., by Blumberg's Black Bashaw, dam by Morgan Hunter.  
Little Fred, by Eastman's Morgan, dam by Blackbird.  
Mambrino Gift, by Mambrino Pilot, dam by Pilot, Jr.  
May Queen, by Alexander's Norman, dam by Crockett's Arabian.  
Nancy Hackett, by Wood's Hambletonian, dam unknown.  
Orange Girl, by Rysdyk's Hambletonian, dam by American Star.  
Prospero, by Messenger Duroc, dam by Harry Clay.

## TROTTING TO WAGON.

- One mile, (first heat)—Hopeful, Chicago, Ill., Oct. 12th, 1878, 2:16 $\frac{1}{2}$ .
- One mile, (second heat)—Hopeful, Chicago, Ill., Oct. 12th, 1878, 2:17.
- One mile, (third heat)—Hopeful, Chicago, Ill., Oct. 12th, 1878, 2:17.
- One mile, (drawing 2,000 lbs.)—Mountain Maid, Long Island, 1865, 3:24 $\frac{1}{2}$ .
- Two miles, (first heat)—Gen. Butler, Long Island, 1863, 4:56 $\frac{1}{4}$ .
- Two miles, (second heat)—Dexter, Long Island, Oct. 27th, 1865, 4:56 $\frac{1}{4}$ .
- Three miles.—Kemble, Jackson, June 1st, 1853, 8:3.
- Four miles.—Longfellow, California, Dec. 31st, 1869, 10:34 $\frac{1}{2}$ .
- Five miles.—Little Mack, Long Island, Oct. 29th, 1863, 13:43 $\frac{1}{2}$ .
- Twenty miles.—Controller, San Francisco, Cal., April 20th, 1878, 58:57.
- Fifty miles.—Spangle, Oct. 13th, 1855, 3 h. 49:4.

## TROTTING DOUBLE TEAMS.

- One mile.—Dick Swiveler and Edward, Narragansett Park, Aug. 18, 1884, 2:16 $\frac{1}{4}$ .
- One mile, (third heat)—Gen. Cobb and Lulu, San Francisco, Cal., May, 1877, 2:26 $\frac{1}{2}$ .
- One mile, with running-mate, (first heat)—Ethan Allen and mate, Long Island, June 21st, 1867, 2:15.
- One hundred miles.—Master Burke and Robin, 10h. 17:22.

## TROTTING UNDER SADDLE.

- One mile.—Great Eastern, Fleetwood Park, N. Y., Sept. 22d, 1877, 2:15 $\frac{3}{4}$ .
- Two miles.—Dexter, Long Island, 1865, 5:03 $\frac{1}{4}$ .
- Three miles.—Dutchman, Beacon Park, N. J., Aug. 1st, 1839, 7:32 $\frac{1}{2}$ .
- Four miles.—Dutchman, 18 6, 10:31.

## PACING.

- One mile in harness.—Little Brown Jug, Aug. 24th, 1881, 2:11 $\frac{3}{4}$ .
- One mile under saddle.—Billy Boyce, Buffalo, N. Y., Aug. 1st, 1868, 1:14 $\frac{1}{4}$ .
- One mile to wagon.—Pocahontas, June 21st, 1855, 2:17 $\frac{1}{2}$ .
- Two miles under saddle.—Bowery Boy, Long Island, 1839, 5:43 $\frac{1}{2}$ .
- Two miles in harness.—Hero, May 17th, 1853, 4:56 $\frac{1}{2}$ .
- Two miles under saddle.—Onedia Chief, New Jersey, 1843, 7:44.
- Three miles in harness.—Harry White, San Francisco, Cal., Aug. 8th, 1874, 7:57 $\frac{1}{4}$ .

## BEST RECORDS OF FLEETEST RUNNING HORSES.

Giving classified lists of such records, with places, dates, weight carried, age, time in minutes and seconds.

*Quarter of a Mile.*

Belle, Galveston, Texas, July 3, 1880, 21 $\frac{3}{4}$  sec.

*Half a Mile.*

- Olitipa, 2 yrs., 97 lbs., Saratoga, N. Y., July 25, 1874, 47 $\frac{3}{4}$  sec.
- Lizzie S., 2 yrs., 97 lbs., Lexington, Ky., May 8, 1880, 49 sec.
- Harold, 2 yrs., 110 lbs., Saratoga, N. Y., July 23, 1878, 49 $\frac{1}{4}$  sec.
- Idalia, 2 yrs., 107 lbs., Monmouth Park, July 4, 1876, 49 $\frac{1}{4}$  sec.
- Vampire, 2 yrs., 110 lbs., Saratoga, N. Y., July 22, 1881, 49 $\frac{1}{2}$  sec.
- Memento, 2 yrs., 107 lbs., Saratoga, N. Y., July 19, 1881, 49 $\frac{1}{4}$  sec.

*Half-Mile Heats.*

Red Oak, aged, 114 lbs., Carson City, Nev., Sept. 16, 1879, 48 $\frac{1}{2}$ –49 sec.

*Half-Mile Heats, 3 in 5.*

Mollie McCann, 5 yrs., catch weight, Indianapolis, Ind., July 26, 1879, 51 $\frac{1}{4}$ , 51 $\frac{3}{4}$ , 50 sec.

*Five Furlongs.*

- Olivia, 2 yrs., 97 lbs., Saratoga, N. Y., Aug. 5, 1881, 1:01 $\frac{3}{4}$ .
- Lizzie S., 3 yrs., 92 lbs., St. Louis, Mo., June 10, 1881, 1:02.
- Bouncer, 2 yrs., 104 lbs., Monmouth Park, N. J., July 4, 1881, 1:02.
- Mollie Brown, 2 yrs., 97 lbs., Springfield, Mo., June 17, 1880, 1:02.
- Brambletaletta, 2 yrs., 88 lbs., Sheepshead Bay, N. Y., Sept. 4, 1880, 1:02 $\frac{1}{4}$ .
- Gerald, 2 yrs., 110 lbs., Sheepshead Bay, N. Y., June 16, 1881, 1:02 $\frac{1}{2}$ .
- Onondaga, 2 yrs., 115 lbs., Monmouth Park, N. Y., July 7, 1881, 1:02 $\frac{1}{2}$ .
- Bend Or, 2 yrs., 100 lbs., Lexington, Ky., Sept. 18, 1880, 1:03.
- Runnymede, 2 yrs., 103 lbs., Saratoga, N. Y., July 20, 1881, 1:03 $\frac{1}{2}$ .
- Pappoose, 4 yrs., 131 lbs., Saratoga, N. Y., July 16, 1881, 1:03 $\frac{3}{4}$ .

*Five-Furlong Heats.*

Ingomar, 2 yrs., catch weights, Mount Holly, N. J., Oct. 10, 1879, 1:07, 1:03.

*Three-Quarters of a Mile.*

- Barrett, 2 yrs., 110 lbs., Monmouth Park, N. J., Aug. 14, 1880, 1:14.
- Knight Templar, 3 yrs., 77 lbs., Sheepshead Bay, N. Y., Sept. 18, 1880, 1:14.
- Gouverneur, 2 yrs., 82 lbs., Sheepshead Bay, N. Y., Sept. 18, 1880, 1:14 $\frac{1}{4}$ .
- Gouverneur, 2 yrs., 98 lbs., Sheepshead Bay, N. Y., Sept. 25, 1880, 1:14 $\frac{1}{2}$ ; after dead heat with Ada, 2 yrs., 87 lbs., 1:14 $\frac{1}{4}$ .
- Patti, 3 yrs., 92 lbs., Chicago, Ill., July 2, 1881, 1:14 $\frac{1}{2}$ .
- Charley Gorham, aged, 103 lbs., Sheepshead Bay, N. Y., June 29, 1881, 1:15.
- One dime, 5 yrs., 120 lbs., Saratoga, N. Y., July 21, 1881, 1:15 $\frac{1}{4}$ .

*Three-Quarter Mile Heats.*

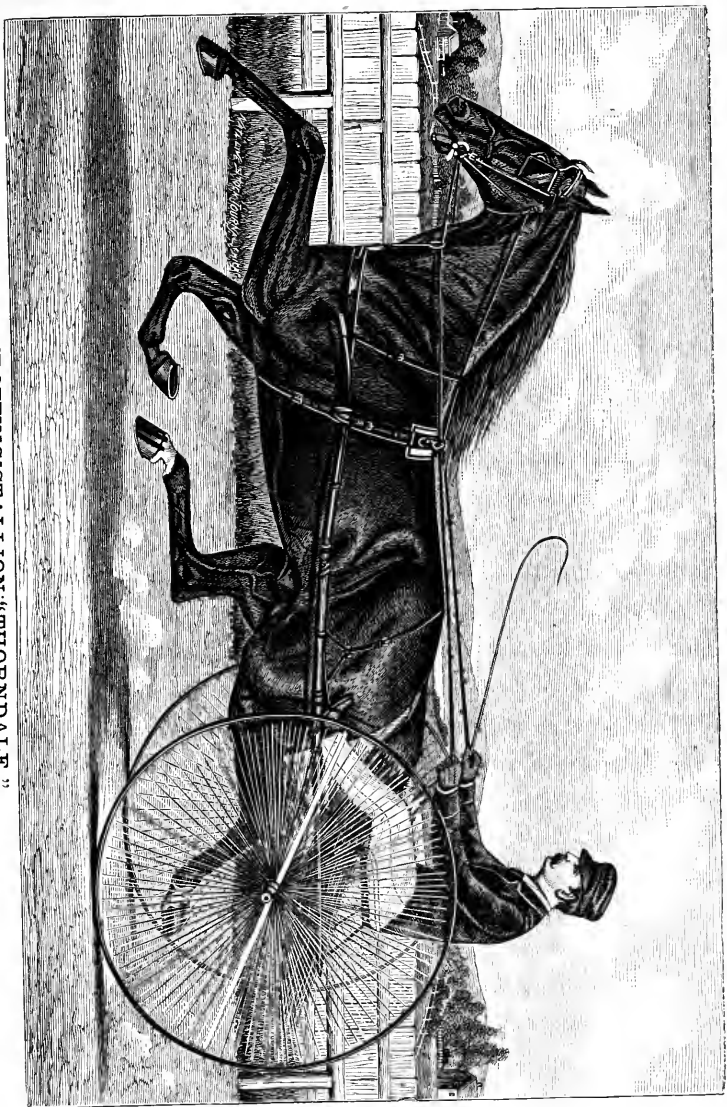
- Bonnie Lizzie, 3 yrs., 101 lbs., Saratoga, N. Y., Aug. 16, 1881, 1:15 $\frac{1}{4}$ , 1:14 $\frac{1}{4}$ .
- Charley Ross, aged, 118 lbs., Brighton Beach, N. Y., July 1, 1881, 1:15, 1:15. L. B. Sprague, 4 yrs., 108 lbs., won first heat in 1:17.
- Knight Templar, 3 yrs., 92 lbs., Louisville, Ky., May 24, 1880, 1:15, 1:17.

*One Mile.*

- Ten Broeck, 5 yrs., 110 lbs., Louisville, Ky., May 24, 1877, "against time," 1:39 $\frac{1}{4}$ .
- Boardman, 4 yrs., 91 lbs., Sheepshead Bay, N. Y., Sept. 20, 1880, 1:40 $\frac{1}{2}$ .
- Marchioness, 5 yrs., 64 lbs., Brighton Beach, N. Y., July 6, 1881, 1:41.
- Victim, 5 yrs., 117 lbs., Saratoga, N. Y., Aug. 1, 1881, 1:41 $\frac{1}{4}$ .
- Knight Templar, 4 yrs., 106 lbs., Saratoga, N. Y., Aug. 6, 1881, 1:42.
- Parole, aged, 102 lbs., Baltimore, Md., Oct. 21, 1880, 1:42.
- Hindoo, 3 yrs., 118 lbs., Sheepshead Bay, N. Y., June 15, 1881, 1:42 $\frac{1}{4}$ .
- Mistake, 2 yrs., 100 lbs., Louisville, Ky., Sept. 36, 1879, 1:42 $\frac{3}{4}$ .

*One Mile Heats.*

- Gabriel, 5 yrs., 115 lbs., St. Louis, Mo., June 13, 1881, 1:42 $\frac{1}{4}$ , 1:41 $\frac{3}{4}$ .
- Dan Sparling, 4 yrs., 106 lbs., Sheepshead Bay, N. Y., Sept. 21, 1880, 1:42, 1:44 $\frac{1}{4}$ .
- Ada Glenn, 4 yrs., 106 lbs., won first heat in 1:41 $\frac{3}{4}$ .
- Glennmore, 6 yrs., 114 lbs., Sheepshead Bay, N. Y., June 16, 1881, 1:42 $\frac{1}{4}$ , 1:46 $\frac{1}{4}$ .
- Dan Sparling, 5 yrs., 114 lbs., won first heat in 1:42 $\frac{1}{2}$ .



TROTING-STALLION, "THEORNDALE,"  
Property of Edwin Thorne, "Thorndale," Millbrook, N. Y.



*One Mile Heats, 3 in 5.*

Thad Stevens, aged, 110 lbs., Sacramento, Cal., July 8, 1873, 1:43½, 1:46½, 1:45. Thornhill, 4 yrs., won the first and second heats in 1:43, 1:43.

*Mile and a Furlong.*

Bob Woolley, 3 yrs., 90 lbs., Lexington, Ky., Sept. 6, 1875, 1:54.  
Greenland, 3 yrs., 108 lbs., Saratoga, N. Y., July 23, 1881, 1:54½.  
Patti, 3 yrs., 89 lbs., Chicago, Ill., June 28, 1881, 1:54¾.  
Kinjar, 5 yrs., 115 lbs., Louisville, Ky., Sept. 30, 1880, 1:54¾.  
Baby, 4 yrs., 105 lbs., Brighton Beach, N. Y., July 31, 1880, 1:55.

*Mile and a Furlong Heats.*

Gabriel, 4 yrs., 112 lbs., Sheepshead Bay, N. Y., Sept. 23, 1880, 1:56, 1:56.

*Mile and a Quarter.*

Getaway, 3 yrs., 100 lbs., Saratoga, N. Y., Aug. 5, 1881, 2:07¾.  
Mendelssohn, 3 yrs., 95 lbs., Lexington, Ky., May 10, 1880, 2:08.  
Sir Hugh, 3 yrs., 102 lbs., Saratoga, N. Y., July 19, 1881, 2:08¾.  
Checkmate, 6 yrs., 117 lbs., Saratoga, N. Y., July 16, 1881, 2:08¾.

*Mile and a Quarter Heats.*

Glenmore, 5 yrs., 114 lbs., Sheepshead Bay, N. Y., Sept. 25, 1880, 2:10, 2:14.  
Mary Anderson, 3 yrs., 83 lbs., won first heat in 2:09.

*Mile and 500 Yards.*

Valleria, 3 yrs., 94 lbs., Saratoga, N. Y., Aug. 1, 1881, 2:19½.  
Ripple, 3 yrs., 109 lbs., Saratoga, N. Y., July 20, 1881, 2:14.

*Mile and Three Furlongs.*

Uncas, 4 yrs., 107 lbs., Sheepshead Bay, N. Y., Sept. 23, 1880, 2:21¾.  
Luke Blackburn, 3 yrs., 96½ lbs., Sheepshead Bay, N. Y., June 22, 1880, 2:24½.  
Spendthrift, 3 yrs., 123 lbs., Jerome Park, N. Y., June 10, 1879, 2:25¾.

*Mile and a Half.*

Luke Blackburn, 3 yrs., 102 lbs., Monmouth Park, Aug. 17, 1880, 2:34.  
Tom Bowling, 4 yrs., 104 lbs., Lexington, Ky., May 12, 1874, 3:34¾.  
Hudoo, 3 yrs., 118 lbs., Saratoga, N. Y., Aug. 4, 1881, 2:36.  
Parole, 4 yrs., 97 lbs., Saratoga, N. Y., Aug. 4, 1877, 2:36¾.  
Liatnalle, 5 yrs., 112 lbs., Chicago, Ill., June 25, 1881, 2:37½.  
Gabriel, 5 yrs., 115 lbs., St. Louis, Mo., June 11, 1881, 2:37¾.

*Mile and a Half Heats.*

Keno, 6 yrs., catch weight, Toledo, O., Sept. 16, 1880, 2:43½, 2:45. Belle of Nelson, 5 yrs., won second heat in 2:45.

*Mile and Five Furlongs.*

Ten Broeck, 3 yrs., 90 lbs., Lexington, Ky., Sept. 9, 1875, 2:49½.  
Eole, 3 yrs., 100 lbs., Saratoga, N. Y., Aug. 3, 1881, 2:49¾.  
Checkmate, 5 yrs., 111 lbs., Sheepshead Bay, N. Y., Sept. 16, 1880, 2:50.  
Monitor, 3 yrs., 98 lbs., Prospect Park, N. Y., Sept. 13, 1879, 2:50½.

*Mile and Three-Quarters.*

Glenmore, 6 yrs., 100 lbs., Sheepshead Bay, N. Y., June 23, 1881, 3:01½.  
Checkmate, 6 yrs., 124 lbs., Saratoga, N. Y., Aug. 6, 1881, 3:01½.  
Monitor, 4 yrs., 115 lbs., Monmouth Park, N. J., Aug. 19, 1880, 3:02¾.  
Crickmore, 3 yrs., 111 lbs., Sheepshead Bay, N. Y., Sept. 7, 1881, 3:03¼.  
Luke Blackburn, 3 yrs., 105 lbs., Louisville, Ky., Sept. 30, 1880, 3:04.  
Bartaguan, 3 yrs., 110 lbs., Saratoga, N. Y., July 24, 1875, 3:06½.  
Luke Blackburn, 3 yrs., 116 lbs., Saratoga, N. Y., Aug. 7, 1880, 3:07.  
Hindoo, 3 yrs., 118 lbs., Saratoga, N. Y., July 16, 1881, 3:07½.

*Two Miles.*

Ten Broeck, 5 yrs., 110 lbs., Louisville, Ky., May 29, 1877—“against time”—3:27½.  
Bashwhacker, aged, 99 lbs., Saratoga, N. Y., Aug. 18, 1881, 3:30.  
McWhirter, 3 yrs., 100 lbs., Louisville, Ky., May 28, 1877, 3:30½.  
Hindoo, 3 yrs., 118 lbs., Saratoga, N. Y., Aug. 11, 1881, 3:32.

*Two-Mile Heats.*

Willie D., 4 yrs., 102 lbs., Prospect Park, N. Y., Sept. 11, 1879, 3:34½, 3:35.  
Lottery, 3 yrs., 100 lbs., Sacramento, Cal., Sept. 21, 1878, 3:36, 3:37½.  
Bushwhacker, 4 yrs., 105 lbs., Baltimore, Md., Oct. 23, 1878, 3:36, 3:38½.  
Princeton, 4 yrs., 108 lbs., won second heat, 3:39½.

*Two Miles and a Furlong.*

Aristides, 4 yrs., 108 lbs., Lexington, Ky., May 10, 1876, 3:45½.  
Mate, 6 yrs., 114 lbs., Saratoga, N. Y., July 31, 1875, 3:46¾.  
Ferida, 5 yrs., 109 lbs., Sheepshead Bay, N. Y., June 20, 1881, 3:48.  
Glenmore, 5 yrs., 114 lbs., Sheepshead Bay, N. Y., June 26, 1880, 3:48½.  
Springbok, 5 yrs., 114 lbs.; Prackness, aged, 114 lbs., “dead heat,” Saratoga, N. Y., July 29, 1875, 3:50½.  
Glenmore, 6 yrs., 114 lbs., Sheepshead Bay, N. Y., June 18, 1881, 3:58¾.  
Blue eyes, 5 yrs., 115 lbs., Chicago, Ill., June 20, 1880, 3:58¾.  
Harry Bassett, 4 yrs., 108 lbs., Saratoga, N. Y., July 16, 1872, 3:59.

*Two Miles and a Half.*

Aristides, 4 yrs., 104 lbs., Lexington, Ky., May 13, 1876, 4:27½.  
Katie Pease, 4 yrs., 105 lbs., Buffalo, N. Y., Sept. 10, 1874, 4:28½.

*Two Miles and Five Furlongs.*

Ten Broeck, 4 yrs., 104 lbs., Lexington, Ky., Sept. 16, 1876, 4:58½.

*Two Miles and Three-Quarters.*

Hubbard, 4 yrs., 107 lbs., Saratoga, N. Y., Aug. 9, 1873, 4:58¾.  
Kentucky, 5 yrs., 124 lbs., Jerome Park, N. Y., Oct. 3, 1866, 5:04.

*Three Miles.*

Thora, 3 yrs., 99 lbs., Saratoga, N. Y., Aug. 27, 1881, 5:25½.  
Ten Broeck, 4 yrs., 104 lbs., Louisville, Ky., Sept. 23, 1876—“against time”—5:20½.  
Elias Lawrence, 3 yrs., 98 lbs., Saratoga, N. Y., Aug. 28, 1880, 5:28½.

*Three-Mile Heats.*

Norfolk, 4 yrs., 100 lbs., Sacramento, Cal., Sept. 23, 1865, 5:27½, 5:29½.

Brown Dick, 3 yrs., 86½ lbs., New Orleans, La., April 10, 1855, 5:30¾, 5:28.

NOTE.—Brown Dick would have been a 4-year old under present rules.

*Four Miles.*

Ten Broeck, 4 yrs., 104 lbs., Louisville, Ky., Sept. 27, 1876—“against time”—7:15¾.

Fellowcraft, 4 yrs., 108 lbs., Saratoga, N. Y., Aug. 20, 1874, 7:19½.

Lexington, 4 yrs., 103 lbs., New Orleans, La., April 2, 1835—“against time”—7:19¾.

Janet, 6 yrs., 115 lbs., Louisville, Ky., Sept. 27, 1879, 7:25.

*Four-Mile Heats.*

Perida, 4 yrs., 105 lbs., Sheephead Bay, N. Y., Sept. 18, 1880, 7:23½, 7:41.

Lexington, 4 yrs., 103¾ lbs., New Orleans, La., April 14, 1855, 7:23¾.

NOTE.—Lecompte was withdrawn after the first heat.

Lecompte, 3 yrs, 86 lbs., New Orleans, La., April 8, 1854, 7:26, 7:28¼.

Thad. Stevens, aged, 115 lbs., San Francisco, Cal., 7:30, 7:43. Joe Daniels, 4 yrs., 103 lbs., won first heat in 7:42¼.

Glenmore, 4 yrs., 108 lbs., Baltimore, Md., Oct. 29, 1879, 7:30¼, 7:31.

Willie D, 4 yrs., 105 lbs., won first heat in 7:29½.

**HURDLE RACES.**

[One Mile, over Four Hurdles.]

Judith, 5 yrs., 145 lbs., Brighton Beach, N. Y., July 17, 1880, 1:51.

[Mile Heats, each Four Hurdles.]

Joe Rhodes, 5 yrs., 140 lbs., St. Louis, Mo., June 4, 1878, 1:50¾, 1:50¾.

Frank Short, 4 yrs., 135 lbs., St. Louis, Mo., June 11, 1880, 1:51¼, 1:54¼.

Bay Rum, aged, 130 lbs., Sheephead Bay, N. Y., June 25, 1880, 1:51, 1:57. Gallagher, aged, 100 lbs., won first beat in 1:51½.

[Mile and a Furlong, over Five Hurdles.]

Glasgow, aged, 160 lbs., Saratoga, N. Y., July 30, 1884, 2:07.

[Mile and a Quarter, over Five Hurdles.]

Ohio Boy, 6 years, 140 lbs., Brighton Beach, N. Y., Sept. 17, 1880, 2:19.

Glasgow, aged, 146 lbs., St. Louis, Mo., June 6, 1881, 2:20. Waller, 6 yrs., 162 lbs., Saratoga, N. Y., Aug 14, 1878, 2:21½.

[Mile and a Half, over Six Hurdles.]

Ventilator, aged, 137 lbs., Brighton Beach, N. Y., July 31, 1880, 2:49¾.

Proben, 6 yrs., 158 lbs., Monmouth Park, N. J., Aug. 14, 1880, 2:50.

[Mile and Three-Quarters, over Seven Hurdles.]

Judith, 5 yrs., 150 lbs., Monmouth Park, N. J., Aug. 19, 1880, 3:17¾.

[Two Miles, over Eight Hurdles.]

Tom Leathers, aged, 117 lbs., New Orleans, La., April 16, 1875, 3:47¼.

Ventilator, aged, 135 lbs., Sheephead Bay, June 20, 1880, 3:49¼.

Redman, 4 yrs, 132 lbs., Louisville, Ky., May 19, 1876, 3:48¾.

[Two Miles and a Quarter, over Nine Hurdles.]

Cariboo, 5 yrs., 154 lbs., Monmouth Park, N. J., Aug. 28, 1875, 4:33.

**The Breeding of Horses.**—The improvements that have been brought about among the various classes of domestic animals through the efforts of intelligent breeders is truly wonderful, and although many obstacles in this department are to be constantly met, and many intricate questions that present themselves in the pursuance of this art must forever continue to remain mysteries, yet, in the main, breeding has been reduced to a science, and the governing principles and laws in this department of Nature's vast laboratory have come to be so well understood that the skillful breeder can mold, as it were, by a judicious selection and combination, based upon a knowledge of hereditary law, the ideal animal into the real, and can prospectively determine, with considerable certainty, the result of such selection and union. The breeder may, therefore, be said to possess, in a great measure, the creative power, making use of the material that he finds within his reach—as the potter does the clay—to combine and mold the object desired, after the various patterns and designs, for the different uses to which the result of his effort is to be appropriated.

Thus we have to-day among horses, those intended for speed in running and trotting; for style, the different classes of carriage-horses; those adapted especially for the saddle; the heavy draft-horse, and the general-purpose horse, or what might be termed the model farm-horse.

In view of what has thus far been accomplished, the intelligent breeder has great encouragement to continue his efforts towards farther developments and improvements, for the field is indeed a vast one, and it seems almost impossible to reach the limit.

Those animals that combine the greatest number of excellences for the use to which they are to be appropriated are, of course, the best; but as what would be desirable in one type or class of horses would be an objection in another class, the purpose for which the animal is to be used should first be considered. For instance, the form of the trotter would

be incompatible with that of the draft-horse, while the latter would also be objectionable in the carriage-horse, etc.; therefore, many of the desirable qualities in different classes of horses, being antagonistic, cannot be combined in a single animal, and hence the necessity of adapting the animal to its especial use.

The breeding of horses is a very important subject, since it relates to the agricultural interests of the country so extensively. But when we consider the lack of interest that farmers generally take in this department, it is not surprising that we see so many inferior horses. It is rather the occasion of surprise that the common farm-horse is as good an animal as we find him, when so little pains are taken generally towards his improvement.

With most farmers, the opinion is prevalent that when a mare has become useless for any other purpose, having become old, or broken-down by hard work, sprained, spavined, and perhaps diseased, she will do well enough for raising colts.

How in the name of common sense a person can expect a colt worth the raising from such stock is difficult to understand, and yet farmers are constantly doing this all over the country. If good stock is desired, it will be necessary to secure good stock as the progenitors, in order to reach the desired results.

**Disqualifications for Breeding.**—At the outset, to be successful in breeding requires outlay and careful selection. A person cannot reasonably expect that from a dam that is perhaps not worth twenty dollars, and a sire whose real value may be but little more, that the progeny will be equal to a St. Julien or a Maud S. Old age alone is a sufficient disqualification for breeding, and when we add to this, unsoundness and disease, the objections become doubly intensified. The colts from such stock will lack vitality and endurance, since they will inherit these tendencies from their progenitors, and such a method of breeding is not only a direct violation of all physiological law, but of all the teachings of common sense and experience combined, and cannot be too strongly condemned.

No matter how active and valuable an animal may have been in her prime, if old and broken-down, the foal will inherit the infirmities of old age rather than the excellences of her younger days. Therefore, never breed from a mare that is old and infirm, no matter how pure her "blood" may be.

Never breed from a horse that has the heaves or is spavined. The tendency to transmit disease is as strong in animals as in the human family, and a horse that has any weakness about the organs of respiration will be almost sure to transmit this tendency. The same may be said of any of the other forms of disease. Lameness, although it may have been produced by accident, will also be liable to be transmitted to the foal. Colts from such mares will be apt to become lame in early life, through inherited weakness. In fact, any infirmity, disease, or defect, in either sire or dam, will be very liable to be reproduced in the progeny.

An animal for breeding should be free from a vicious disposition and temper, as well as bad habits of every kind. A cross, ill-tempered mare or stallion will be likely to perpetuate this tendency in the offspring, while, if both parents possess these traits, an ill-tempered, vicious colt may be expected as an absolute certainty.

Even a tendency to cribbing is known to be inherited. The same law holds true relative to temperament, form, color, size, etc.

Always breed up, and never down; that is, never breed a dam to a sire of inferior blood. It is also highly essential that the dam possess qualities desirable to be transmitted to the progeny, as her influence in this direction nearly, if not fully, equals that of the sire.

**Influence of the Sire and Dam.**—The Arabs have a maxim that "the foal follows the sire," yet at the same time they always select their dams with much care.

Notwithstanding the Arab maxim, we believe the qualities of the dam are of as much importance as those of the sire, and that the progeny will inherit the mingled characteristics

and qualities of both parents. It is generally thought—although individual cases differ, according to different circumstances—that in the majority of cases, the male parent gives size and form to the bones and muscles generally, while the female parent influences the nervous system, and frequently the form of the head and adjacent portions of the body. W. C. Spooner, a leading English authority, says, respecting this opinion, in the Journal of the Royal Agricultural Society :—

“The influence of male and female parent is not capricious, but yet not always alike; in the majority of instances the male parent gives the size and external shape of the offspring (particularly the back and hind-quarters), while the female influences the constitutional, the nervous system, and often the head and fore-quarters. That this combination—which may be more of a mechanical mixture than a chemical union—by no means implies such an equal division of influence, as the mingling of two fluids—in which case the offspring would be unlike either parent, but a *juste milieu* between the two, and there could be no handing down of type from one generation to another—it is rather such a fusion of two bodies into one, that both defects and high qualifications are passed on from parent to offspring with a sort of regular irregularity resembling the waves of the sea, each parent having the remarkable power of propagating ancestral peculiarities, though latent in itself.”

Another English authority, the author of “Breeding, Rearing, Feeding, and General Management of Farm-Horses,” says:—

“Instances have come under the notice of the writer where a tribe of horses have been bred in one family for many generations, the mares of which all inherited from the female ancestors the bad habit of kicking in the yoke; and although crossed with very docile sires, the same propensity and nervous temperament was transmitted from one generation to another; others again preserve the unwelcome and annoying habit of being shy pullers; and others, again, where the mares are hot-tempered, tearing workers, but deficient in stamina or staying power. Owners sometimes breed from a mare that is hot-tempered, or a kicker, to sober her down a bit. They invariably succeed in perpetuating a breed which should be allowed to become extinct. The importance, therefore, of selecting a quiet-dispositioned mare of sound constitution for breeding purposes is apparent. By sober-tempered, a sluggish animal is not meant, activity being very essential in a brood mare, especially in her walk, as this is the most important pace for farm work. Either meeting you or leaving you, a horse should go square; the fore action should be straightforward, the fore-feet should not be thrown out sideways, as it were. It is also necessary that a farm-horse should be able to acquit itself well in a trot; and the words of an enthusiastic Scotchman when once describing a brood mare can be repeated, when he said, ‘Her very step had music in’t.’”

The rule previously recognized does not hold true in all cases, since individuals differ so greatly with respect to the power of transmitting their qualities to their progeny. Murray says in this connection:—

“The instances in which the foal does not follow the sire are too numerous for us to allow that the Arabian maxim is worthy of being regarded as a law. Even a casual inspection of my own stables, or the stables of any breeder, would cause a grave suspicion to arise in any thoughtful mind touching the Eastern adage. I have, for instance, in my stables, dams whose foals invariably resemble the sire in size, shape, color, style of going, and even in temperament; and these mares are valued by me as almost beyond price, because of this peculiarity. *I know beforehand what I shall get.* On the other hand, I have two other mares whose colts invariably resemble themselves, or some one of their parental ancestors. So true is this, that I can calculate before the foal appears what he will *not* be, although I may not easily tell what he *will* be. Such are the *facts* in my own stables; and they harmonize perfectly with the results of observation in many other breeding establishments. The law plainly suggested by inference from these facts is this, *that the animal with the strongest vitality marks the foal.*

If the dam be most highly organized, then the foal will resemble the dam; if the sire, then the foal will resemble the sire. This is the law, as we all know, in the human family: if the mother be of nervous, sanguine temperament, and the father lymphatic and sluggish, the child will take after the mother; if the conditions be reversed, the result will be the reverse. Exceptions there may be and are; but the law stands firm, vindicating its truth with each successive generation. I am bound, nevertheless, to say that this law does not hold good in cases where we should naturally expect it would. To illustrate: According to the law, when a low-blooded mare is bred to a thoroughbred horse, the foal should resemble the sire; but, alas! too often he does not. On the other hand, according to the law, a blooded mare bred to a low-blooded horse should bring forth a colt like herself; but neither is this true. What, then, becomes of the law? I confess that I do not know; nor have I been able to find in the works of any author a satisfactory answer to the puzzle. Practically, although I cannot philosophically account for my preference, yet *practically*, I say, we know that it is far better to have a high, fine organization in the sire, and let the low organization, if it must exist in either parent, be on the side of the dam. The fact is, both parents should be highly organized, and anything short of this introduces uncertainty as to what the result of the experiment will be. The only infallible rule,—the best statement ever given touching the reproduction of any form of life,—was published by God himself in His inspired word, when he said, "Let the earth bring forth the living creature *after his kind*." This, nevertheless, must be observed, that the power to bring forth *after his kind*,—if by *his kind* we mean personal resemblances, rather than generic attributes,—does not belong to the horse as a race, but to the horse as an individual; for, as we have already seen in the case of Justin Morgan, this faculty of reproducing excellences is individual, and not general. And so we come back to the same observation previously made in regard to what constitutes a valuable stock-horse,—viz., that the best horse is he who, being good in himself, most surely and closely reproduces himself in his offspring; and to this formula should now be added the words, *when bred to the mares of the greatest variety of form and temperament.*"

As a general rule, although, as we have previously seen that individual cases will differ, the purer or less mixed the blood, the more likely are the characteristics of the breed to be transmitted to the progeny, and consequently, the parent that possesses the purest blood, or in whose pedigree the fewest crosses with other breeds are found, will exert the most influence upon the offspring, and be the most largely represented in it.

In the breeding of domestic animals, the male parent is commonly selected with more care than the female, since one animal of this kind impresses itself upon so large a number, consequently it follows for this reason, as the usual result, that the sire exerts more influence than the dam; but when the dam is of superior blood to the sire the result would be the reverse. When both parents are equally well-bred, other conditions being equal, the influence will be divided, the sire perpetuating some characteristics, and the dam others.

**What Horses to Breed.**—For the reproduction of its kind, whether in vegetable or animal life, the best results can only be reached by employing for this purpose the best and highest types of the species to be perpetuated. For this reason, the most intelligent and successful agriculturists select the seed for future crops from the most thrifty and perfectly developed plants, and by this means not only prevent deterioration of the variety, but frequently improve upon it. In the animal kingdom the same law of selection is equally important. The most perfectly developed, vigorous, and healthy animals of the breed should be selected to reproduce it.

The kind of horse to be bred will, of course, depend upon the use to which it is to be appropriated, whether it be the stylish carriage-horse, the trotter, racer, the saddle-horse, the general-purpose or farm-horse, or the heavy-draft animal. Whatever breed is to be perpetuated, the best and most perfect types should be selected, and not only this, but those

possessing the purest blood, whose pedigree may be traced back to the best stock, for it is well known to breeders of experience, that however good an animal may be in himself, if he be of mongrel stock, his progeny will not be likely to represent his accidental good qualities, but will rather be more liable to revert back to their inferior ancestry, it being the natural tendency in animals to revert back to the original type. For this reason those mares should be selected that are the most closely allied to the best blood, and only thoroughbred or high-grade stallions should be employed. Selections, even from thoroughbred stallions, should be made with care, for many will be found objectionable for use; but a low-bred stallion should ever be avoided.

It is a well-known fact that a large majority of the horses that have distinguished themselves by their achievements are the descendants of superior ancestors, the exceptions being very rare. At the same time, circumstances may exert such a controlling influence that some of the most noted horses may produce but ordinary or inferior foals. The expenditure of nervous energies through a long campaign upon the race-course is decidedly opposed to the best physical condition for reproduction, in either sire or dam, and the highest possibilities of either can never be attained in this respect, while their vital forces are being used up for racing purposes. This truth has been signally exemplified in employing, for breeding purposes, some of the noted trotting mares in their old age, and after their muscles and nerves had been subjected to a severe strain, and in a great measure exhausted in trotting performances.

Neither Flora Temple, Lady Thorne, nor Lucy have ever produced foals that have won recognition in trotting circles, although the sires of their progeny were of most desirable pedigree. Another important point, and yet the most frequently overlooked in breeding, is in the combination; the unskillful mating of the dam and sire being the rule, rather than the exception. There is much truth in the following:—

“Peculiarity of form and constitution will also be inherited. This is a most important but neglected consideration; for, however desirable or even perfect may have been the conformation of the sire, every good point may be neutralized or lost by the defective structure of the mare. The essential points should be good in both parents, or some minor defect in either be met, and got rid of, by excellence in that particular point in the other. The unskillful or careless breeder too often so badly pairs the animals that the good points of each are almost lost, the defects of both increased, and the produce is far inferior to both sire and dam.”

Breeders that are careless in this respect can expect nothing but inferior results, for it must be remembered that while the general law, oft repeated, that “like produces like” is true in the main, there are many exceptions, and that where either animal is deficient individually, or their ancestors, it is often the case that the undesirable qualities are more readily perpetuated than the desirable ones, and, therefore, too much care cannot be taken to secure, as far as practicable, a mutual adaptation in form, size, temperament, disposition, etc., between the sire and dam.

Never breed an exceedingly small mare to a large stallion, or the reverse, as the result will be anything but satisfactory. It will sometimes be found that the crossing of certain good strains of horses will invariably, without any known cause, bring poor results. In such instances their crossing should be avoided. The frame of the mare should be roomy, wide at the hips, wide-chested, deep in the girth, quarters strong, and hocks rather wide apart.

In the selection of both dam and sire, those qualities desirable to be possessed by the foal should, as far as practicable, be represented in both parents. As these qualities have already been previously stated, a repetition will be unnecessary in this connection. Suffice it to say, that in breeding, aim to secure all the essential qualities, and as many of the other *desirable* ones as possible; therefore, breed for beauty, style, speed, docility, strength, endurance, and as many of the other qualities to be preferred as possible, combining with these the size and

form which are desirable in the horse we wish to produce. Both animals should be strong, vigorous, and in the best condition of health. In this great undertaking, where so many have failed, those will meet with the highest success, who, to zeal and enthusiasm combine knowledge and patient effort, considering well beforehand what they wish to accomplish, and by the use of that knowledge in careful selection and combination aim for the best results.



STALLION "FRANK ALLEN." PROPERTY OF JOHN R. FARNUM, WALTHAM, MASS.

**Care of Stallions.**—The following sensible method with reference to the care of stallions is recommended by J. E. Russell, Secretary of the Massachusetts Board of Agriculture:—

"When a horse begins a stud career, his owner should absolutely withdraw him from the worry and excitement of training. Horses kept for service, and trained at the same time, will get nervous and excitable stock. But a worse error still is to put a horse into a condition of flesh, like a prize pig, in order to brag of how much he weighs, and to keep him, without exercise, in the close confinement of a box-stall, until he becomes a moody, morose, and often savage brute. Many stallions become partially insane under the common treatment, and are a pest to their owners, dangerous to grooms, and beget vicious stock. A stallion should be kept in good health and moderate flesh. His box should be where he can have the constant company of other horses, or in sight of his mares. He should have a paddock to run in, or have plenty of cut grass during his season. He should be exercised in double harness, or under the saddle accompanied by other horses, as often as convenient. His exercise should be brisk and blood-stirring, with occasional sharp work, so as to get a good sweat. Under such treatment, a stallion, unless he is naturally a vicious brute, will be as cheerful and pleasant to keep as any mare is."

**Care of Breeding Mares.**—It is very essential that brood mares be kept in good condition. A half-starved dam cannot produce a strong and thrifty foal, since her blood

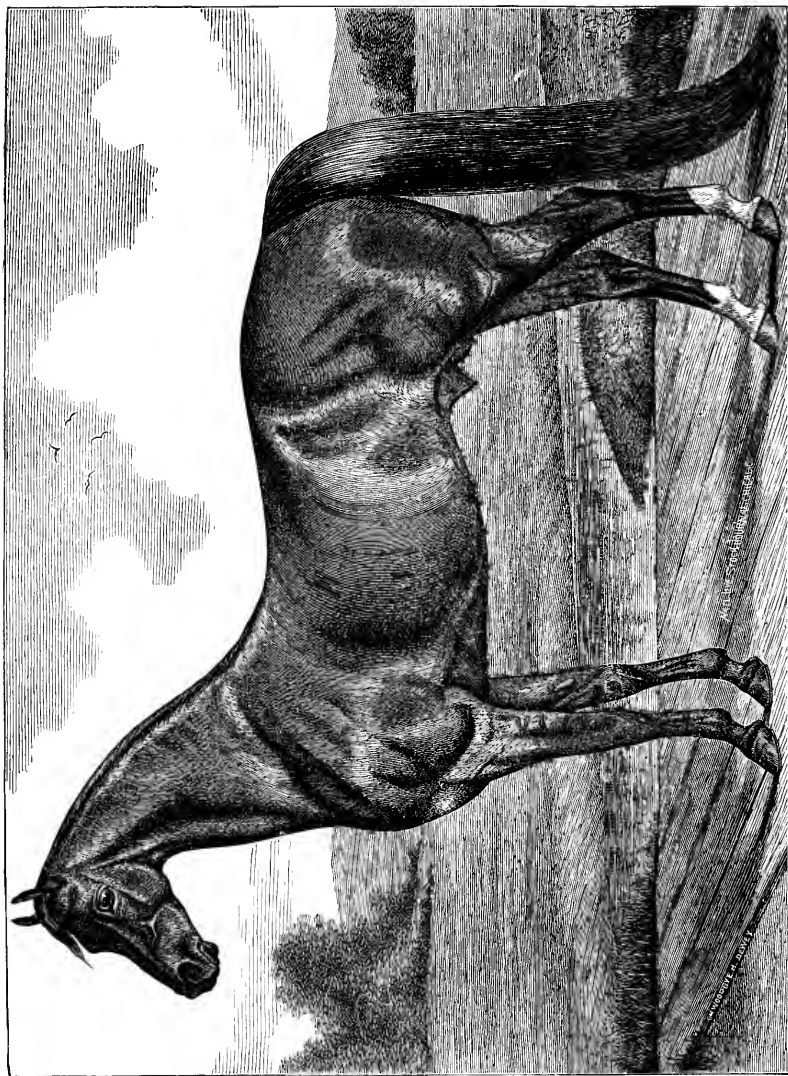
must nourish the young life and contribute to its support and growth until it makes its entrance into the world. She should have a liberal supply of food of the best kind, and be provided with warm quarters in winter. Moderate work up to within two or three weeks of foaling will not prove injurious; but excessive labor, such as straining, and drawing heavy loads, should be avoided. She should be kept quiet and apart from other horses, after the first four or five months. The period of gestation varies somewhat with different mares, but is usually from forty-seven to fifty weeks, although sometimes not more than forty-four weeks, and occasionally as long as fifty-six weeks. When the time of foaling is near — say about two or three weeks previous — she should be put into a large box or stall, where she should be allowed her freedom; this should be done especially nights, while during the day she might, if desired, be allowed the freedom of the yard, or near pasture. The box should be of large size, twelve by twenty feet being good dimensions, and thickly strewn with sand, gravel, saw-dust, or tan-bark, over which a bedding of straw or dry leaves should be strewn to the depth of about a foot.

Some mares will eat their bedding. If there is any tendency in this direction, she should have a muzzle of wire put on and wear it, except when eating her rations, as it is not well for a mare to be filled with coarse food at such times. Care should be taken to have everything in the box so arranged that there will be no danger of her getting cast, should she lie down to roll. After foaling, she should still be very liberally fed. Stinting both mother and foal at this period will be found very poor economy, for, if stunted in growth at this early stage of his life, the young colt will never wholly recover from the effect. During all the period of gestation, the mare should be treated with the greatest kindness. She should never receive a blow, or even a harsh word. Either will sometimes cause her to slink the foal.

**Care of Young Colts.** — If the colt is strong and vigorous at birth, he will not require much special attention; but if he is unable to get on his feet soon after, it is best to assist him to do so. If he is too weak to stand, he should have his body and limbs rubbed, especially the latter, to promote circulation. A woolen cloth dipped in water, blood-warm, should be first used, after which a dry woolen cloth, to dry him off, followed by hand-rubbing. This rubbing will promote circulation throughout the entire system, and give strength to the muscles. It should be kept up until he is able to stand. If left lying unattended in a weak state, to take care of himself, he will be quite as liable to die as to live. He should be held up to the dam, so that he can draw the milk as soon as he is strong enough. He should not be allowed to get chilled, but be kept warm and comfortable. In order to have a colt become a strong, vigorous, and well-developed animal, he should be well fed. Never stint him at all at any period of his life, and especially at the start.

Particular attention must be paid to his growth during his first summer and autumn, for if stunted then, he will never recover from it under any circumstances. There is quite a difference in dams with regard to the quantity of milk they are able to supply. As previously stated, the dam should be very generously fed in order to produce the largest supply of milk possible for the foal, while if lacking at all in quantity, and she fails to keep him in good flesh and steadily improving, a sufficient supply of cows' milk should be given him daily to make up the deficiency. Skimmed milk may be used for this purpose, but in such cases a little flax-seed jelly, oil-meal, or cotton-seed meal (a heaped tablespoonful night and morning, to begin with), should be mixed with it. This can be gradually increased to a pint a day by the time the colt is six months old, or, if he be of the large breed, double this quantity may be given. Oats should also be given as soon as they can be eaten. Many breeders bruise the oats for them at first. When the dam is fed, her rations of oats should be placed where the colt may eat with her, and it can be depended upon that when allowed this opportunity he will not be long in availing himself of it. A half pint of oats at night and in the morning is sufficient to allow him at first, which rations can be increased to four quarts per day,





**TROTting STALLION "ALEXANDER,"** Time 2:28 $\frac{1}{4}$ .  
Property of De Graff & Hopkins, Janesville, Minn.

according to his age and size. If to the above a couple of quarts of wheat-bran are added twice a day, great advantage will be derived from it, since the latter is not only nourishing, but helps to keep the bowels in good condition and is an excellent preventative of worms.

Food that will produce bone and muscle should be given at this growing period, rather than such as will divert from this to simply the accumulation of fat. The food for all young animals should be given in small quantities and often, and the rations gradually increased according to the wants of the animal. True economy does not consist in cheap food, but rather such as is adapted to the wants of the animal, of whatever kind it may be.

A floor of plank, cement, or hard material of any kind, will be liable to injure the feet and legs of colts when permitted to stand much on them. Soft, wet ground, or mud, will be very apt to make the hoof tender, no matter how highly-bred or how perfect in texture the hoof of the ancestry may be.

The dam, when fully recovered from foaling, may be put to light work. The foal should at first be shut in the stable during the hours of work; but when he is sufficiently strong to accompany her, it will be better for them both to be together, if the work is slow and does not involve too much travel for him. This will obviate the fretting of the dam for her colt, while he will be able to take more milk from her and thrive better, and will also become familiar with the objects about him, and among which his life is to be spent. When over-heated with work, she should not be allowed to suckle the colt, till she is well cooled off, as her milk in this condition will have a tendency to produce diarrhea in the foal.

When a little older, in case the dam is used on the road, the colt can have his halter on and accompany her, having the halter tied to the shaft or to the harness. By this means he is under control, is not liable to get injured, and will soon become halter-broken.

**Weaning.**—When five or six months old, according to his vigor and size, the foal may be weaned. It is a good method to halter both dam and colt, giving them a single, large stall, where they can eat and rub noses together at the same manger. The dam and colt will both be contented then, for they will not miss each other. The colt should be untied and allowed once a day, for a few days, to relieve the udder of the dam. The colt will also eat at the regular feeding-times, increasing his rations, as he is deprived of his mother's milk. After a while he can be removed to his own stall. By this means the colt is nearly halter-broken without trouble.

Another method frequently practiced is to put the dam and colt in adjoining box-stalls, for a few days, where the partition is so high that they cannot get together, but where they may see each other, and allow the colt to draw the milk once a day for a few days, after which it may be taken to its winter quarters. When confined in a stall by itself, the colt should have the freedom of it, and the stall should be large, light, and airy. Besides the exercise it may thus get, it should have a run in the yard an hour or two every day, when it is not too stormy. Plenty of clean bedding should also be provided.

A seven-months'-old colt will take from six to seven quarts of wheat-bran per day in connection with other food, while a yearling will take a peck a day, together with oats and hay. It must be remembered that this is the growing season, and material must be furnished for producing bone, muscle, and nerve, or the animal will not have sufficient to build up the structure that should go forward until the complete size and stature of the horse is attained. A few carrots, cut fine, given with oats and wheat-bran or oil-meal, make good rations for colts about the time of weaning and afterwards. They should not, however, be fed to the young colt in too large quantities. Good hay should always be given them in any quantity that they will eat.

Colts should never be exposed to storms and cold weather, nor the intense heat of the summer sun. When out in the open air in cold weather, a warm shed should be provided, into which they may go in the day-time when they wish, and at night they should be com-

fortably stabled. In the summer they should be allowed the freedom of the pasture, where there is plenty of good grass, water, and shade. The shade should consist of not only trees, but a shed where they may find shelter from the hot sun. It is not advisable to put colts into a pasture with cows. When turned together, there is danger of either the colts being hooked by the cows, or the cows kicked by the colts. Neither is it well to put a colt into a pasture alone; two or more colts together will be more contented and do better than when alone, or with cows.

**Raising a Colt by Hand.** — If the dam should dry her milk, or if for any other reason it becomes necessary to raise a colt by hand, it may be done as easily as raising a calf, lamb, or any other young animal. The milk of a cow that has recently calved should be given the foal. This should be mixed at first with about one-third of its quantity of warm water, and sweetened with sugar. After a week or so, the milk will not require watering. He should be fed four times a day until four or five weeks old, after which twice or three times a day may be sufficient, if he has learned to nibble fresh grass a little. It is better to feed small quantities and often, rather than larger quantities at longer intervals. Horses are naturally very particular about their food, and the pail from which the colt is fed should be scalded every time it is used, to keep it sweet and clean. If his bowels become constipated, two or three tablepoonsful of olive oil may be necessary to promote the proper laxative condition. Sweetening his milk with molasses will sometimes produce the same result, where the constipating tendency is but slight.

He should first be allowed to suck the finger in feeding, but may be taught to drink in a few days. Wheat bran, bruised oats, etc., should also be given him as soon as he will eat them, according to previous directions in feeding colts. Care should be used to give him a proper quantity of food, and at the same time not to over-feed, either being alike injurious. The quantity required will depend upon his size, age, etc.

**Castration.** — The age at which this operation can best be performed depends upon different circumstances, such as the difference in breeds, the form of the animal, the use to which it is to be appropriated, etc. The longer the colt remains entire, the better developed will the neck and fore parts of the body become; for this reason, we think it best to delay it as long as practicable. It can be safely performed as soon as the testicles have descended into the scrotum, but when performed thus early it will materially affect the development of the forehead. It is frequently done when the colt is a year old, and sometimes before it is weaned, but as a general rule, we think from a year and a half to two years is better. As regards age, the young animal will suffer less than those older, as the parts are not so well developed, consequently smaller, and their removal will not produce such a shock to the constitution. Their rapid growth also at this period causes the wound to heal quickly, with less tendency to a fever. The danger increases with colts from two years old and upwards. Castration is generally performed earlier on farm, than carriage horses. *The National Live Stock Journal* contains the following valuable directions respecting the conditions, preparations, etc., for this operation: —

“Castration is often performed by the owner, by a herdsman, or by some other non-professional man, rather than the veterinarian, and it is therefore especially important that it should be generally understood what conditions contribute to obviate the attending dangers, and insure a successful result.

**Health.** — Perfect health of the animal is essential to safety. Any pre-existing disease is pretty certain to be aggravated by the irritation and fever resulting from the operation; any impairment of the nutritive functions will retard the process of healing in the wound, or induce an unhealthy action resulting in permanent injury or death. If disease germs are in the system, their development is hastened, and the system has to bear the attack of two

different troubles combined; or both concentrate their action on the same point, and the extension of the diseased action to the susceptible structures of the abdomen too often precipitates a fatal result. Thus strangles, so common in young horses, causes a low type of inflammation in the groin, with exudations, adhesions, abscesses, and even gangrene. Glanders, too, is attended by the development of the glanderous material in the wound and elsewhere, and always by a fatal issue. Scarcely less injurious are influenza, catarrhal fever, bilious fevers, etc., etc., the seeds of which find a fertile field for their development in the system fevered by the operation.

The system most favorable to success is one in high condition, with full, hard muscles; clear, bright, prominent eye; smooth, sleek, healthy coat; pulse full, strong, and regular; and spirit lively and ardent. The best condition is, in short, that of the trained animal, in which the wounds heal with that marvelous rapidity which we see in the athlete or race-horse. It is not the fat animal, soft, flabby, and deficient in endurance, but the one that is all muscle and sinew, and that will not tire. Yet, even with this, it is important to give daily exercise after the operation. If kept up in a stall, the animal accustomed to regular exertion quickly becomes plethoric, and thus his great powers of digestion and assimilation conduce to unhealthy rather than healthy action in the wound. If such an animal must stand in the stable after the operation, his fine condition will be rather prejudicial, and should be reduced somewhat by a dose of physic prior to the operation, and a restricted diet after. A very fat animal may be advantageously treated in the same way. The very poor are liable to have the healing process retarded, and to have a low type of inflammation in the wound, with extensive swelling, gangrene, or inflammation of the lining membrane of the abdomen, or, in less redoubtable cases, local abscess, or tumor of the cord. These should have their condition improved before they are castrated.

No male should be castrated until it has been ascertained whether there is any hernia (rupture) into the scrotum. The sack of the scrotum should contain nothing besides the testicles. Any descent of abdominal organ may be felt at the front and sides of the testicle, and the thickening will be continued upward beside the cord into the abdomen. If pressed, it will return slowly at first, and then suddenly and completely. Such subjects should be left to the veterinarian for a special operation.

*The Surroundings.*—The season is a most important consideration. In pigs and other animals that tend to heal by adhesion of the lips of the wound, and without the formation of matter, a cool or even a cold season is not prohibitory; but in the horse, in which all wounds tend to form matter, and where the dangers of inflammation extending to the abdomen are so great, a temperate or even warm season is the best. The end of April or May is usually preferable as being mild, but not hot, and at the same time equable. From July onward the intense heats unduly favor putrefaction in the products of the wound, and excessive swelling in its walls. At this season, too, flies prove a source of great annoyance, and are even liable to infect and poison the sore by coming direct from carrion or diseased surfaces. So long as the nights are liable to be frosty or very cold, colts should not be castrated, unless they can be stabled and protected. In all cases the newly-castrated animal should be protected against cold rains or dews, drafts of cold air in buildings, large drinks of ice-cold water, and damp bedding. Wet weather, but above all that which is characterized by a succession of thunderstorms, is to be feared, not alone because of the danger of wetting and chill, but because at such times there is a special tendency to rapid decomposition in all dead organic matter, and therefore to putrefaction in the secretions of the wounds. This tendency is familiar in the souring of milk or dough, and in the penetrating smells that rise from any accumulation of damp vegetable rubbish. In such a season, therefore, the operation should be deferred until the return of steady, clear weather.

For reasons similar to the above, crowded, close, ill-ventilated, and uncleanly buildings

are most dangerous, and animals from such places are best kept for some time in more healthy quarters prior to castration. The vicinity of slaughter-houses, rendering-works, dissecting-rooms, manure-manufactories, decomposing dung-heaps, etc., are to be avoided as calculated to induce unhealthily action and gangrene.

*The Operator.* — The castrator should avoid all dead, decomposing, or unhealthy animal matter. Suppurating wounds, but especially those not doing well, cases of difficult parturition, dead bodies, and all unmanufactured animal products should be carefully avoided. If the operator has run the risk of such contamination, he should wash his hands thoroughly in water containing some carbolic acid or chloride of lime, fumigate his clothes with the smoke of burning sulphur, and allow at least twenty-four hours to elapse before he proceeds to operate. The most scrupulous cleanliness of all instruments is no less essential, as valuable animals are often lost through the retention on these of invisible particles in a state of putrefaction."

*The Operation.* — This very delicate operation, and the one attended with so much risk to the life of the animal, requires much care and skill on the part of the operator to result successfully, as animals often suffer severely and sometimes die from the effects of an unskillful operation, change of weather, or other unfavorable conditions. W. H. Herbert asserts that "it should never be attempted on a living subject except by a person of experience and skill," in which opinion we fully concur. It will certainly be much safer and more economical in the end to employ the services of an intelligent and skillful veterinarian, than for a farmer to attempt to do it himself, unless he has a good knowledge of and experience in such cases. No one should think of attempting it who does not possess these requisites. The use of chloroform will be found highly beneficial in such operations, and should always be employed, as it is more humane, since it obviates all pain, and also prevents the severe struggles of the animal, which are often attended with serious results.

The old method was to make an incision in the scrotum on either side and cut off the testicles, and prevent bleeding by a temporary compression of the cords while they were seared with a hot iron. This was a terribly painful process for the animal to undergo, and is now generally abandoned for the more humane and improved method.

The new method of castrating with the *ecraseur* is a great improvement upon the old, and also very simple, especially to a person having any experience with the old.

In operating, an incision is made through the subcutaneous tissues, which thus exposes the testicle. The chain of the *ecraseur* is then placed over that portion of the cord intended to be severed, and the instrument gradually tightened until the cord is completely severed. This should be done gradually and very carefully. But very little hemorrhage will follow, if it is performed with care. Sometimes tying is resorted to to prevent bleeding.

Another method is by torsion, and is described by Youatt as follows: "An incision is made into the scrotum, and the *vas deferens* is exposed and divided. The artery is then seized with a pair of forceps contrived for the purpose and twisted six or seven times around. It retracts without untwisting the coils, and the bleeding ceases; the testicle is removed, and there is no sloughing, or danger. The most painful part of the operation, that with the firing iron or the clamp, is avoided, and the wound readily heals."

The old method of castrating with the clamp is an extremely cruel one, and should be forever abolished.

Castrating horses designed for farm, carriage, and general-purpose use, is commonly practiced in this country and England, as they are thus more docile and more easily managed; but in France and in Oriental countries castration is rarely performed, as they are thought to be more hardy and possess greater courage and endurance without it.

**Docking and Nicking.**—The custom of docking the tails of horses, so prevalent some years ago, both in England and America, is as absurd as it is cruel, and should become forever obsolete. It is a great disfigurement to a horse, and many an otherwise beautiful animal has been in a great measure shorn of his beauty for life by this means, while there is really no advantage to be gained by it. The argument claimed in favor of docking is that it prevents the animal from switching its tail over the reins, which in many cases, with a high-spirited horse, might cause him to become frightened and the driver to lose control over him. All trouble from this cause may be prevented by having an iron or steel rod fastened from four to six inches above the whole length of the dash-board, for the reins to rest upon. This will keep them so much higher than the rump of the horse that he will not be able to switch his tail over them.

Nicking is a barbarous and inhuman custom, formerly fashionable, but now nearly obsolete. It should be forever prohibited by law. The man who practices it, justly deserves to suffer the severe penalties of the law. A horse with his tail shortened by docking, or weakened by nicking, endures great annoyance from the flies, besides the suffering inflicted at the time of the operation. Horses upon which the latter has been practiced have sometimes died of lock-jaw.

**Bleeding.**—There are *very rare* instances in the treatment of horses in which bleeding is beneficial. The practice of frequent bleeding, and for almost every ailment, as followed in the old time heroic treatment, we are glad to record as now obsolete, except it may be still adhered to by a few ignorant quacks, or so called "horse doctors," who, not knowing what else to do for the poor animal under their charge, will generally administer a sufficient amount of powerful drugs to nearly kill him, and then proceed to reduce what little vitality he has left by bleeding, or they will reverse the treatment, and bleed first, and drug afterward, and if the horse manages to live through it all, they will take to themselves great credit for skill in the *remarkable cure* they have performed!

The blood is that upon which the vital forces depend, containing the very element of life, and the withdrawal of it frequently, or in large quantities, cannot be otherwise than weakening to the vital forces of the animal system. Nature generally supplies the proper amount of blood required by the system, and when this amount is often reduced, there will be an unnaturally vigorous action in the blood-forming process, in the effort to make up for the deficiency of bleeding, which may in time become habitual and result in an apoplectic condition. It is safe to assert as a general rule, with few exceptions, that nature performs her work best without interference from man. In apoplexy, staggers and a few other diseases or conditions, bleeding may prove very efficacious, but it should be done with the greatest care, and by the direction of an intelligent veterinarian.

In bleeding, a fleam or lancet may be used. The horse should be blindfolded in order to keep him quiet during the operation. The jugular vein is generally selected for the purpose, the point to be chosen being about two inches below the junction of the two portions of this vein, at the angle of the jaw. If a gentle pressure be applied with the finger of the left hand, the vein will enlarge and be distinctly traced at once. The edge of the lance or fleam should be placed directly in line with the course of the vein, and over its center. Great care must be used not to cut so deep that the opposite side of the vein will be opened. A small quantity of blood drawn quickly is much more beneficial than a larger quantity drawn slowly. The quantity to be drawn will depend altogether upon the condition of the animal, and the purpose of the treatment. We are decidedly opposed to large quantities being taken for any purpose.

When sufficient blood has been taken, the edges of the wound should be brought closely and evenly together, and held so by a small sharp pin being passed through them carefully, and a few hairs from the mane, or thread wound around enough to cover the wound. The animal should be so tied, for a few hours, as to prevent rubbing the place against anything.

**The Old-Time Method of Managing Colts.**—It was the prevalent opinion of our forefathers, that in order to produce a hardy animal, it must be subjected to hardships and privations; hence when a colt was a few months old, he was usually turned out to pick up a living for himself as well as he could in the pastures, generally running with other young horses or cattle. When the cold weather of winter set in, he was in some sections provided with shelter and scantily fed with hay, often having to take up with the refuse and rejected portions of the older and stronger stock; but in many localities colts were turned out to shift for themselves during the entire winter, without shelter except what could be found under trees, fences, or on the leeward side of an occasional hay stack, and would not be seen by the owner for two or three years except by accident. The wild pastures or prairies would in summer afford a comfortable supply of grass, but the scanty feed in the winter would reduce his flesh to such a degree, that were it not for the rough, shaggy coat kind nature gave in her sympathy for his protection in his forlorn condition, he would seem smaller in the spring than the previous autumn, so that in the second year although he would be a little larger, it would be difficult to tell a two-year colt from a yearling by his appearance. When the time came that he was to be "broken," as it was called, the animal would be looked up and driven to his owner, and some rough specimen of humanity known by the professional (?) term of "horse-breaker,"—a recognized character in every country town and village,—would be sent for, and the poor animal put under his charge to receive his instructions, which generally consisted of blows, kicks, and the tortures of the biting bridle; who whipped him to make him go when he did not know what was wanted, or how or which way to go, and then whipped him to make him stop, when he did not know that he must. If in his terror and torture he reared or balked, he received more blows and kicks and jerkings on the cutting bit, until in his fright and sufferings he was incapable of understanding what was wanted of him, and would either be spoiled in temper, if naturally spirited,—or have all the spirit and intelligence taken out of him by such ignorant and cruel treatment. After these experiences, he was taken to the blacksmith's shop where his hoofs were often cut down to the quick, the place where he stood not unfrequently being marked by the blood that oozed out, and then shod in the most awkward manner. Afterward, under the ignorant opinion that nature did not know how to do her work perfectly, and that the horse was not complete without man to rectify her mistakes, a hot iron was procured, and the roof of his mouth burnt and mangled, to cure him of the "lampers," supposing the ridges found in every young horse's mouth to be a disease or unnatural, and that they prevented the horse from eating well. We are glad to know that a great improvement has, for the most part, been effected in horse management within a few years past, and that the practices, formerly deemed necessary, have in the main become obsolete, except perhaps here and there in an occasional locality that may be as far behind the present age in other respects as in ideas on this subject, and where the old regime of "breaking colts" is still practiced with all its cruelty, and injurious results.

**The Present System of Colt Management.**—There is an old adage that "Half the horse goes down his throat." However true this may be, it is apparent to every intelligent supervisor of young stock, that during the growing or building period, when there is such a demand for material for structure, the animal must be fed and cared for in the most judicious manner. Believers in the old time starving and toughening process are at present fortunately hard to find, and it is now a generally accepted fact that the first two years of the animal's life is the time in which to make the horse; in other words, the care and attention bestowed upon the colt during this period have more influence in determining the future value of the animal, than that of subsequent years. It is now generally understood by all intelligent breeders that if the colt is not kept growing he is dwarfed in size, and hence his value lessened, and money lost to the owner. He must be kept growing, and in order to accomplish this, he must be supplied with material for the purpose. As oats are the natural food of the horse, the little weanling should have from two to four quarts of bruised oats each

day, according to his age, and occasionally a little wheat bran and oil meal, besides all the good hay or ensilage he will eat. When the colt is a year old or more, he can have a larger quantity of oats, providing he has a large yard for exercise, the aim being to have him fit for light work when three years old; some breeders claim that by this process the colt may be used a little for light work at two years of age; if used at all at this age, however, the work should be very light, or the animal would be liable to be injured seriously. Heavy work at this growing period should always be avoided. It can be readily seen that by this method of caring for colts, horses can be raised with more profit to the owner, than by the former practice of sometimes keeping the animal until he was five or six years old before making him useful; and that keeping a horse that length of time before he earns his living, is a losing course from the time he is three years of age. Mr. J. E. Russell, Secretary of the Massachusetts Board of Agriculture, says:—

“Every breeder should be fond of association with animals: he should be a judge of form, health, and improvement, and he should understand how to handle them. There are no secrets in the horse business that men of average intelligence in regard to animals cannot at once master. Quiet, patient ways, with low voice, and gentle but strong hand, will teach a colt all that he needs to know. There are men in every neighborhood who can break colts safely to harness, and by persistent, careful practice, fit them to stand quietly, to stop at the given word, and to be way-wise on any roads. In my county of Worcester, there are communities where they take great pride in educating oxen; and I have seen, at Worcester and at Franklin County cattle shows, steers trained to an incredible point of intelligence and docility. Boys that can train a steer to walk a chalk-line, and to go on his knees at the word of command, can do wonders with horses; for the horse enjoys the companionship of man, responds at once to kindness, and, next to the dog, has the quickest intelligence of any of our domestic animals. Horses for profit must be sold young, unless they earn their living every day. Leave speculation to jockeys and dealers; sell when you have a customer; sell whenever a reasonable profit is offered to you. The best time to sell is before the colt is foaled, to some one who is in love with the dam: the next best time is when the foal is weaned. To the common eye, all weanlings will make fine horses; and the price of a weanling generally pays more profit than the breeder ever has offered to him again. When your colt is past two, every hour that you delay to sell is ‘burning daylight.’ Early maturity is one of the great advantages in thorough blood; and no man can afford to breed from any family that is slow in maturing.”

The best practice, and the one followed by the most successful managers of horses, is to begin breaking or teaching the colt while he is yet a mere suckling by the side of his dam. A very little pains at this period will teach the baby-horse that it has nothing to fear from the presence of man, and that no harm can come to it from being handled from head to foot. In this way he will soon become perfectly gentle, will easily be led by the halter, and will stand when tied. All the subsequent lessons should be by gradual approaches; the main point being to inspire him with confidence that he will not be harmed. By pursuing this system of gradual approaches with perfect gentleness of manner on the part of the groom or other attendant, there need never be any trouble in breaking the most fiery-tempered colt.

The most intelligent colt will be the most easily managed by this means, for once having learned the lesson of confidence in his master, he can readily be taught to understand and do what is required of him, while a sensitive and naturally timid animal would be spoiled by any other course of treatment. It is not will or obstinacy that are the usual difficulties to be surmounted in breaking colts, but fear, and a failure to understand what is required of them. Rough treatment in the breaking process has spoiled the temper of many a valuable animal, while on the other hand gentle and intelligent instruction improves the disposition and develops the speed and endurance of colts, qualities so excellent in roadsters. The more good qualities developed while young, the greater will be the merits of the adult animal.

How much the skill and genius of man have added to the value of our improved breed of horses, would be difficult to determine. Many a noted trotter would not have sold for a tenth the price paid for him if his fiery, ungovernable temper or ungainly stride had not been modified and improved by the patience, perseverance, and gentle treatment of his trainer; neither would Maud S. have sold for \$21,000 if her noted trainer had not taught her at four years old, to trot a mile in 2:17½. The same may be said of St. Julien and other noted horses. Untrained horses have seldom been sold for high prices. By patience and kind treatment a horse may be trained to do anything required of him that is reasonable, and not only this, but will become so attached to his master, that he will seem to take a kind of pride and pleasure in trying to please him when he once understands what is desired of him. A recent writer, the owner of several fine horses, expresses the following sensible and humane opinion:—

“We would never have a man on our premises who would abuse a horse. The men who ever worked for us were instructed not only to spare the lash, but to spare the tongue. Rough language is nearly as abusive as actual beating. A horse cannot be screamed at and cursed without becoming less valuable in every particular. To reach the highest degree of value, the animal should be perfectly gentle, and always reliable, but if it expects every moment that it is in the harness to be scolded and struck, it will be in a constant state of nervousness, and in its excitement as liable, through fear, to do something which is not expected as to go along doing what you started it to do. It is possible to train a horse to be governed by the voice almost as completely as it is to train a child, and in such training the horse reaches its highest value. When a horse is soothed by the gentle words of his driver—and we have seen him calmed down from great excitement by no other means—it may be very fairly concluded that he is a valuable animal for practical purposes, and it may be certainly concluded that the man who has such power over him, is a humane man and a sensible one. But all this simply means that the man must secure the animal's confidence. Only in exceptional instances is a horse stubborn or vicious. If he understands his surroundings, and what is required of him he gives no trouble. As almost every reader must know, if the animal when frightened can be brought up to the object, he will become calm. The reason is that he understands that there is nothing to fear. So he must be taught to have confidence in the man who handles him, and then this powerful animal, which usually a man could not manage, if it were disposed to be vicious, will give no trouble. The very best rule, therefore, which we would lay down for the management of the horse is gentleness and good sense on the part of the driver. Bad drivers almost invariably make bad horses.”

If farmers and the owners of horses generally would be more particular in the choice of those whom they employ to have charge of their animals, in all stages of their growth, whether as young colts, draft or carriage horses, they would not only find it more agreeable in having better tempered and more easily managed horses, but also more profitable in a money point of view, since such animals will command a higher price in the market than those made vicious, nervous, and unmanageable from unkind treatment.

The writer has known of many valuable animals being utterly ruined by the bad management and cruel treatment of so-called “professionals” in colt-breaking. In one instance, a valuable colt of four years of age was so wretchedly handled that in three weeks' time she was not worth a dollar for after-use. Another was so cruelly treated in the “bitting process” (a thing which no man who truly loves his horse will ever allow), that, in horsemen's phrase, “she had no mouth;” and when abused with voice or whip, would drop her jaw back against her neck, and run away and break things, in spite of the efforts of her driver to stop her. In this instance a naturally fine animal was ruined, and practically worthless when “broken,” as the expression is. Another animal, from the same stock as the preceding ones, and now in her thirtieth year, never was broken, in the common meaning of the term, and will not be when she dies; but willing and true to bit or voice, she has been faithful and fruitful in good





**TAGGART'S "ABDALLAH."**  
Owned by D. M. Taggart, Goffstown, N. H.

works all her life long, perfectly gentle, although a very spirited animal, but peculiarly sensitive to harsh treatment of any kind, and would have been rendered utterly worthless by it.

**Halter Breaking.**—The best method of teaching a colt, is to commence at birth, and by gradual approaches accustom him to be handled. Thus, by kindness and gentleness, his first lesson should be, that he has nothing to fear from man, but that his master is his friend and protector. This lesson must invariably be first taught, in order to attain the highest success in subsequent efforts, in bringing him under complete subjection, and in developing the best qualities of the animal. This method of colt breaking was well understood and practiced by the ancients, as will be seen from the writings of Xenophon, which were penned about twenty-three hundred years ago, as follows:—

“Care must be taken, that when the breaker receives the foal, he be gentle, tractable, and fond of men. For he is generally rendered so at home by the groom, if the foal is made to understand that hunger, thirst, and irritation are procured by solitude; and that meat, drink, and freedom from irritation are procured by men. When these things take place, foals not only love, but long for men. It is necessary also to touch those parts which, when touched, give greatest pleasure to the horse; and these are the hairiest, and those parts in which, when he feels any pain, he cannot relieve himself.

The groom should be enjoined to lead him through a crowd, and cause him to approach all kinds of sights and sounds. Whichever of these the foal may dread, it is necessary to teach him, not by harshness, but gentleness, that they are not dangerous.”

The young colt should be handled every day, gently and quietly, patting or rubbing him with the hand only in those parts of the body that it is agreeable to him to be touched, such as the back, top of the hips, under the neck and head,—places that he cannot easily rub himself, or touch with the mouth or feet. Horses do not usually like to be touched on the flanks, or the inside of the stifle, under the breast, or on the ears, and such places should be carefully avoided. Attentions of this kind should be frequent, but never tiresome to him.

These instructions should begin during the first week of his life, for the earlier this is learned, the easier will it be to teach him, and when once taught, it will never be forgotten. Many breeders teach the foal to be led by the halter during the first two or three weeks. If the dam is to be used on the road, the colt will, when strong enough, soon learn to accompany her by having his halter attached to the harness or shaft.

When being weaned, he may be tied by her in the stall, as previously recommended, which will also further accustom him to the halter. By commencing early, there is no acquired habit to be overcome, and he should be taught only just what you desire him to know. Let him know that you are his friend, and by patient and gentle efforts he will soon be able to understand what is desired of him, and, if he has confidence in you, will willingly yield obedience. When he does well, he should be praised for it, and made to understand, by gentle pats and kind words, that it is appreciated. Animals, even the most stupid, will very quickly translate such acts and words into their true meaning, and the horse, being one of the most intelligent of the brute creation, will soon catch the meaning of what is intended for him to know. Never pull him back on the halter, as so many ignorant, so-called “horse-breakers” do, under the stupid idea that a constant pulling will teach him to walk fast. It will only teach him the reverse, and to hang back, and when this habit is once acquired, it will be almost impossible to break it.

The halter should be of some soft and strong material—leather being best—which will not chafe or fret him, and it should be made to fit well and not hurt his nose when he pulls. If he should once break the halter and get away, it would be a bad lesson that he might never forget.

Never use a rope for a halter on an unbroken colt, as it would chafe and make him nervous and uncomfortable. With a rope halter, a colt will be very liable to pull, rear, and

throw himself, since the rope will hurt him, and cause him to try to get his head out of it, and the more he pulls, the more the hard, cutting rope draws upon the sensitive flesh, the slip-noose tightens and pinches his nose, until, with pain and fright, his struggles to get free often result in serious injury to the animal. Besides this, a horse that has once had such an experience of pulling at the halter will always remember it, and cannot be as well broken as one that has never pulled at all.

The best method to teach the colt to lead, if he has not previously been accustomed to it in accompanying the dam, is not to go in front and attempt to pull him after you, but to pull him gently to one side, as he will then not be as liable to brace himself and pull back, and thus acquire the habit of pulling. After he has been a step or two one side, let him rest a moment, while you pat him a little, all the time speaking kindly to him; then pull him gently by the halter to the other side, always speaking the word "come." In a short time he will learn to associate the word with the act of starting, and learn what it means. If he resists, be patient yet firm. If the resistance seems to be through fear, handle and pet him until he loses all fear of you before attempting to force him to yield.

If the resistance appears to be obstinacy, gradually increase the strength upon the halter until he is forced to yield to it. Never jerk or pull suddenly on the halter. After a few moments of rest, this may be repeated, always speaking to him when you want him to go; by this means he will learn to start when told.

Never forget to praise and caress him when he does well, but never punish him at this period.

After a little patience on the part of the trainer, and perhaps resistance on his part, he will soon suffer himself to be led wherever he is desired to go. The trainer may be amused at the exhibition of temper or vexation on the part of the colt during the trial, but he must never allow himself to be angry. He must simply "hold his own," never jerk or twitch on the halter, but steadily and firmly enforce obedience. Obedience, pure and simple, without enmity or fright, must be obtained to reach the best results in halter-breaking, and, in fact, in everything pertaining to the training of the colt at any period. By once learning in this manner that man is stronger than he, he will never forget it, and will the more readily yield obedience when he becomes stronger than man. Don't fail to encourage him by praise and gentle pats when he does well; he will learn to love his master for it, and submission will be pleasure. If he shows much temper, it must be remembered that some of the most intelligent and valuable horses have been naturally high-tempered, but have been subdued and made the valuable animals that they were, through kindness, combined with firmness and persistence.

When visited in the stable, frequently carry him something to eat that he likes; an apple, piece of cake, or lump of sugar will go far towards gaining his affection, and making him docile and submissive. The writer has known older horses with vicious habits entirely reclaimed in this way, and who would by this means learn to regard the master's approach as an omen of good to them, and whinny for him on seeing him in the distance, and when sufficiently near would fumble playfully about his pockets with their lips in endeavors to find the present he had brought. Such a horse, ninety-nine times out of a hundred, will prove an obedient, faithful animal. It is said that the way to an animal's heart, or affections, is down his throat. With how much truth may this not be practically applied to many of the human species. Although it is to be regretted, it will quite too frequently be found with mankind, on a severe analysis of motives for professions of friendship and esteem, that self-interest lies at the foundation. If it does not form the entire basis, it will too often be found to constitute some little "corner-stone" in that foundation.

Whatever may be said of this principle respecting mankind, we believe in a generous toleration of it in the management of animals, and particularly horses. The colt should be

made familiar with noises and startling objects, gradually at first by beginning with those of a mild character, until he fails to be frightened at almost anything in sight or sound. This will prevent him from shying suddenly when used in the harness. When well halter-broken, that is, when he will lead readily by the halter, and also stand quietly when tied, he has learned a valuable lesson.

**The Biting Process.**—A smooth bit that will not hurt the mouth of the colt should be used; also, one that has a bar at each side to prevent it from pulling through his mouth either way.

This may be attached to the head-stall of the bridle, without reins, and he be allowed to wear it an hour or two each day, until he becomes accustomed to it, and will bear it without trying to get it out of his mouth. As soon as he will bear it, the reins may be attached. Do not tire or worry him, but let everything that is new to him be gradual.

The method of biting, as followed by many ignorant horse-breakers, cannot be condemned in too strong terms. It is alike inhuman and injurious to the animal, and is practiced under the mistaken idea that by drawing the horse's head out of its natural position, by this torturing process, he will ever afterward carry it in a graceful manner.

The position in which a horse carries his head in harness will depend mainly upon his form and temper. A horse may have ever so much spirit and courage, but, if he have a short neck and perpendicular shoulder, no biting bridle ever invented will give him a gracefully curved neck, and fine style of carriage. Style is something inherent in the animal, and not in the application of any device that may be invented by man. The great object of the biting bridle is to cause the horse to yield to the pressure of the bit, and to teach him to obey the guidance of the reins. The mouth of the colt is very tender and sensitive, and the use of any bit that will cut, bruise, and mangle the gums, tongue, or lips, is not only cruel, but in time renders the colt hard-mouthed and unmanageable. Of course, it is desired that the horse's mouth shall become toughened to the use of the bit, but this will come gradually by daily use. It is not, however, desirable that the mouth shall become so injured by it that the bit will make no impression whatever. Mr. Murray's opinion on this subject is so much in conformity with our own, that we quote it for the benefit of our readers:—

"To see the bits that have been invented, and the 'bitting-machines' that have been patented and sold, to serve this purpose, is enough to set the satirist on edge, and arouse the ire of the humane. The truth is, the only use of any 'bitting-machine,' if it is any thing more than a plain bar-bit in a bridle without blinkers or check-line, is to make money for some ignoramus, and torture the horse. The philosophy of bitting horses, upon which these 'bitting-machines' are founded, is a fraud and folly. There is no more need for them in a trainer's yard than there is in a nursery. I make no limitation or modification of this statement at all. Their true name is 'fool's machine,' and not 'bitting-machine;' or, more properly, if you wish to designate their use and result of it, call them 'machines to spoil horses' mouths;' for this appellation precisely describes them. A man using one ought to be indicted before the common law of the country, which should at least be able to prevent such cruelty to animals. If any owner of a colt who reads this owns or uses one of these 'bitting-machines,' I urge him to burn it or bury it, as the most mischievous and hurtful thing that he can have about his stables. If I wished to make my colts 'hogged-mouthed' and desperate *pullers*, I would use one of these 'infernal machines,' as I have no doubt the colts themselves call them, and as they deserve to be called by colts and men. I will show you how this plan of using these '*machines*' works.

"Now let us begin to *bit* a colt according to the machine method. The colt, never having been even broke to the halter, perhaps, is led out into a yard, the 'machine' strapped on his back, the bit of iron or steel jammed into his mouth, the check-rein adjusted, and the colt's head drawn suddenly up into the air, and the trainer stands one side. The colt, of course,

struggles and rears and plunges. He becomes enraged, and 'fights the bit;' foam drops from his lips; pretty soon it is stained with *streakings of blood*. The iron bit, you see, as he 'fought it,' has grated over the young teeth, cut into the tender tongue, and lacerated the gums and lips. I have *seen* all this done (it is no fancy sketch),—seen blood come in less than *two minutes* after the 'bitting-machine' was adjusted. Now, what has been done? Several things, I reply. First, *unnecessary pain* has been caused an innocent and harmless creature: that alone is enough to condemn any 'machine' ever invented. Secondly, the colt's mouth has been *spoiled* until the lacerated gums and lips and tongue can *heal*. Thirdly, the colt's temper has been soured, and no useful knowledge imparted. These truths are self-evident. But this is not all. The 'machine,' instead of being removed, *is left on*: the trainer goes to his work in the field, or to drive: and the colt is left to 'fight it out.' Now, examine the matter a little. What is the true position of things? This, I respond: The colt is in pain. His head is drawn up to an unnatural height; his neck, pulled into an angle both awkward and painful, aches with exquisite suffering. To appreciate the agony the young thing endures, let some one take hold of your own head, and draw it up and backward as high and as far as the bone-structure and muscles will permit, and compel you to stand with it in that position even for five minutes. In this way you will get some idea of 'bitting-machines,' and the actual torture which colts experience while being 'bitted' by them.

But the evil of this system is not yet fully stated. The colt, with his head drawn up and back, is left in the yard, as I have said, while the trainer goes to his work or to drive. Perhaps he stands an hour; perhaps five hours; very likely all day. For the first few minutes he strives to keep his head up, and the bit loose in his mouth, because it pains him; but pretty soon the muscles of his neck begin to ache. They were never made to hold up the head in that style, and are actually unable to do it for any considerable length of time. Soon the head sags; the pain in the overtasked muscles of the neck is greater even than that caused by the pressure of the bit. It is, you see, with the colt, a choice between two pains. Little by little, the head droops; heavier and heavier the weight of it is laid upon the bit; and, in the course of an hour or two, the colt stands weary and stolid, the weight of his head and neck laid solidly down upon the bit. The colt is being *taught*, you see, to 'take the bit' with a vengeance. He is actually being educated to 'hog on the bit' and be a puller. The true way to bit a colt is *not to bit him* at all; that is, *let him bit himself*."

We remember trying the "bitting machine" just once, about twenty-five years ago, in our first attempt at colt-breaking, supposing it to be a necessary part of the operation. It was a pet animal, a fine, spirited bay mare of the Morgan type. We shall never forget how, after the bit was put on, she followed us around with a mute appeal in her eyes to have it taken off, occasionally rubbing her head against our shoulder, the sweat meanwhile starting from every pore, making her bright bay coat nearly black as it became wet.

After about ten minutes of this method of experiment in colt-breaking, we were convinced of the error of using it, and the agony it was inflicting upon our pet horse, and it was immediately removed and never put on again, though we kept her until she died of old age, which was at about thirty years, after having proved one of the most stylish and best roadsters in the country. We have also been equally successful in breaking other horses, but never have tolerated the cruel bitting process. We believe more horses are either injured, or utterly ruined by it, than by almost any other means.

**Breaking to Harness.**—This may be done when the colt is about two years old, or even younger, and after he has been well halter-broken and accustomed to the bit. Many do this when the foal is from twelve to fifteen months old. The more he has been gentled by frequent handling previous to this time, the easier will all subsequent instructions become. He must not only become accustomed to the harness, but must be taught to stand quietly while the harness is being put on and taken off. Portions of the harness should be put on

gradually, permitting him first to smell of it and touch it with his nose. Animals, especially the horse, depend much upon the sense of smell in becoming acquainted with objects about them, and, having once in this way become familiar with things, they will rarely ever be afraid of them afterwards.

The harness should fit him loosely at first, until he becomes a little accustomed to it, when it can be gradually tightened. He should first be allowed to stand an hour or so with the harness on, after which he can be led about, and thus become used to it while walking. Nothing should ever be done to frighten or worry him, but at the same time he should be taught to yield to his trainer by firmness and kindness. When being led about, he should occasionally be stopped at the place of unharnessing, and allowed to stand about the length of time that would be required to remove or put on the harness; by this means he will learn to stand quietly for this purpose. This should be repeated for several days in succession, until this lesson is thoroughly learned. After this he can be taught to obey the motion of the reins. It is a good plan, also, to accustom him to pressure against the breast and shoulders by fastening strong cords or straps into each side of the collar, and by pulling, gently at first, cause him to use his strength to pull against it; by this means he will get an idea of drawing.

The sulky is much the best vehicle to use in breaking a colt. It should be light, but it is important that it have very strong shafts. After becoming accustomed to the harness, and before being attached to the sulky, the colt should first be led up to it, and, by smelling of it and touching it with his nose, learn that it is nothing from which he has any cause to fear. He may then be attached to it, which should be done as quietly and carefully as possible.

Some prefer to have the colt at this point in breaking driven with another horse. If the latter method is practiced, the horse should be one of the most gentle and submissive, also one the colt has been accustomed to be with. We have always been accustomed to drive a colt singly while breaking, and prefer this method. Everything about the harness and sulky should be very strong, that no accident may be liable to occur, for if the colt should chance to break away he would never forget it, and would be liable to be a runaway at any period of his after-life.

The method we have found most successful is to attach the old farm horse, with whom the colt is well acquainted, (or it may be his dam,) to a wagon, and have this team start in front of him slowly, keeping a few yards in advance of the colt team. In this way he will more readily understand what is required of him, and be more willing to follow where he has such company to lead. It will often be found that when a turn in the road may chance to hide the forward team from sight for a moment, the colt will whinny anxiously, and hasten his gait to catch up.

Teach a horse to depend much upon the voice, which should never be harsh and abusive. By this we do not mean to be understood that we favor the custom of such as are constantly shouting and talking to a horse while driving. We have seen some drivers that we would gladly have seen gagged, or their voice stopped by some other effectual means, and whose constant "whoas," "get ups," "take cares," and similar commands and countermands were enough to puzzle and disgust any animal, as well as human beings. A quiet driver is always the best driver, but when he does speak, he should be understood and obeyed.

The horse should be taught the meaning of but few words, yet these he should learn thoroughly, and when they are spoken to him, he should learn to heed them. By this means many a serious result to an accident or fright of the animal may be prevented. A horse who knows his master's voice, and is accustomed to obey it, and who feels that his master is his protector and friend, will be much more likely to stop at his word, when frightened, than one who has learned to fear his master's voice and lash, when anything unusual happened.

If there is any tendency in a colt to balk, let him stand a few moments, and then by

gentle words or a few pats encourage him forward. Never use the whip under such circumstances. Never get into a quarrel with him. The best way to avoid this is to be patient, gentle, and firm, giving him time to understand what is wanted, and to make up his mind to do it. A horse is naturally spirited, sensitive, and timid, and although a very intelligent animal, yet he must have time to fully comprehend what is wanted before he can perform what is required of him. Everything is strange and new to him, and a little haste might confuse or frighten him, especially if he be of a nervous temperament, to the extent that he might be wholly unable to understand what was for the time wanted.

Teach him to stand quietly while you are getting into the vehicle, and until you tell him to go. This may be soon accomplished by getting in and sitting a while before starting, always speaking the word when you wish him to start, and never under any circumstances allowing him to start of his own accord. The habit acquired by some horses of starting before the driver is half in the carriage, is a pernicious one, and is more the fault of the trainer in permitting it, than of the colt.

A colt should never have his temper spoiled by being teased or annoyed in any way. More horses are made vicious in this way than in any other. He should never be over-exercised, or discouraged by loads that are too heavy for him to draw. Let it be remembered that whatever is done should be done quietly and in a gradual way, no hurrying, no bustle or confusion. Always be true to your teachings to your colt; never contradict yourself, teaching him one thing this week, and the opposite the next. He will remember this if you do; it will confuse him, and be as likely to make him do wrong as right. His lesson must be made as plain for him, as for you. Never put blinders on him while being broken, or at any other time.

We know of an owner and trainer of several colts who, when he goes into the pasture among them, will have them all about him, as gentle as pet kittens, rubbing their noses against him, and each seeming to be jealous of the attentions he bestows upon the others; who run to meet him when they see him coming, and who whinny after him when he leaves them. His method is simply to begin gentling the colts from birth by frequently handling them, and by kindness, gentleness, yet firmness, never deceiving them, and always encouraging and rewarding their obedience. Disobedience he rarely punishes with the whip, but generally by abstaining from the little attentions and tit-bits that are given as rewards at other times.

These are the best means of subduing a colt and making him obedient without crushing his spirit. Such training makes much of the difference between a worthless and valuable horse, for it must be remembered that the qualities that make an animal vicious and ungovernable will, under judicious treatment, make a spirited yet obedient horse, one possessing great intelligence and appreciative of praise or rebuke. If it is thought that the directions given require too much time and labor, let it be borne in mind that the horse is a very valuable animal, and that the labor bestowed upon him at this period greatly increases his value by making him more serviceable, readily managed, safe, and reliable, and when once well broken the lesson learned will be for a lifetime, never to be forgotten.

**Teaching a Colt to Back.**—This may be done by standing in front of him and taking hold of the reins with either hand, give a slight pressure upon the bit, at the same time speaking the word "back."

He will thus be made to step backward a little, and by a few repetitions, always speaking the word, as at first, he will soon learn to associate the movement with it. This is an unpleasant and awkward lesson for him to learn, as it is not natural for any animal to walk backward, and time should be taken, in order not to try his temper and make him obstinate. A few trials each day, for a few days, will generally accomplish it in the most satisfactory manner, and with a slight drawing upon the reins while standing back of him. When he

has learned to go in a harness, this lesson should be frequently repeated. While being broken to the wagon it is a good plan to have him attached to it, and taken where there is an incline, where the wagon will itself tend to run backward, down hill, thus making it easy for him to back it at first. After having accomplished this to the satisfaction of his trainer, he can be tried on level ground, and thus by degrees, adding after a time a slight weight and increasing it, he may learn perfectly the (to him) difficult lesson.

In the same manner he may learn what the word "whoa" means, and to obey it also, and to stop by a pressure upon the bit.

**Breaking to the Saddle.**—This is learned by first putting a saddle upon him, leaving the belts very loose, and omitting the back straps, allowing him to stand in the stable with it on for an hour or two each day, tightening gradually the belly-band. After two or three days put on the back straps, and continue to tighten the belly-band until it is as tight as is customarily worn. He should then be led about until he becomes accustomed to the feeling of the saddle while walking, and when this is thoroughly learned a light weight, like a small bag of grain, may be laid across it. In this way he will learn to carry a weight. He should first be ridden by one he is well acquainted with, and who has charge of him. No colt should, however, carry a heavy weight, such as a rider, for instance, until his back has become sufficiently strong to enable him to do so without injury. The saddle gait can afterward readily be taught. The mounting and dismounting should be done very carefully and quietly at first, in order not to frighten the animal.

**The Age for Working Colts.**—Although for many reasons it is very desirable to break the colt when young, yet it is not well for him to work hard until he has attained his full growth and strength. The cause of so many horses breaking down early, is doubtless due to over-work during the growing period, and before the bones have become sufficiently hardened, or the muscles fully developed. By working a colt hard he will become an old horse when he should be only in his prime. Although it may be expensive to keep a colt doing but comparatively little when he is four or five years old, yet it will pay better in the end than to over-work him, for he will last enough longer to more than make up for it. Every horse should work at least two hours a day; they require exercise in order to promote health, and many horses suffer for want of such exercise, being kept idle in close, confined stables. Either extreme is injurious. Although a colt may do some light work at four, he should not be put to hard service until he is six or seven years old. By such humane and considerate treatment on the part of his owner, he may be made to do good service until he is from twenty five to thirty years old, or even longer, while many hard-worked colts become horses that are past their usefulness at from twelve to fifteen years.

**How to Prevent a Colt from being Easily Frightened.**—There is a great difference in horses with respect to their shying and becoming easily frightened while being driven. The temperaments of animals differ as much as those of the human family, and some horses are naturally more nervous and timid than others. But this can be corrected in a great measure by taking pains to permit a horse to examine and smell of everything that looks new and strange to him. Everyone who has had any experience with horses, or has been at all observing, will know that the natural, and, in fact, the only way in which a horse can obtain a (to him) satisfactory knowledge of objects, is to smell of them; also to sometimes feel of them with his nose. He seems to have no confidence in simply looking at an object, and when greatly frightened at anything startling, will generally cease to fear it afterward, if he can apply his nose to it for a moment, and examine it in this way, thus assuring himself that it will not harm him. And a horse should always be permitted to do this. Some of the most timid and nervous of horses can be greatly improved in this way, and many serious accidents prevented. To whip a horse for being frightened, is the most stupid of

blunders, for he will be all the more liable to fear the same or similar objects again, and such a course will therefore increase the evil, rather than correct it. When breaking a colt, he should be permitted to examine everything used about him in this way, the harness, saddle, wagon, and when an object on the road startles him, he should be led up towards it carefully, and by kind words and pats be assured that it is all right by smelling it.

When young horses are being driven to the city or busy town for the first time, and have to encounter so many strange sights and sounds, if carefully and gently treated, they will soon lose all fear without at the same time losing their courage.

Mr. Rarey tells, in his lectures, an incident of a timid horse shying at a buffalo robe. His ignorant and brutal owner tied him fast so that he could not get free, and laid a buffalo robe on him. The poor animal died almost instantly from fright. Had he been permitted to approach the robe gradually and smell of it a moment, he would probably never have been frightened at a robe afterward.

**Balking.**—This, in the colt, we believe to be mainly due to ill treatment or mismanagement on the part of the trainer. In horses this vice may generally be corrected by patience and kindness, but never by blows, kicks, jerking at the bit, and angry tones. Only the most ignorant and stupid of drivers will resort to such measures.

Cases have come to our personal knowledge where balky horses have been beaten by brutal men until they died from the effects in a few hours afterward, and yet this excessive cruelty did not result in making the horse go. We recall an incident of this kind, of which we afterward had authentic knowledge, that occurred in a small country town, where a horse persistently refused to draw even an empty buggy. The whip was applied without effect, and as the crowd that collected about the exasperated animal knew of no other way of accomplishing the object, it was continued by different members of the company, taking turns, when one became tired. The poor horse died from the effect of the brutal treatment in the course of twelve hours, but during none of the time that he was receiving it, did it have the effect of making him go. Some of the so-called "leading men" of that country town were among that crowd, and helped administer the blows, one or two members of Christian churches, yet none took measures to have this inhuman treatment stopped.

On the other hand, we have known the most vicious and obstinate balkers cured of this vice by a few kind words or pats, or perhaps a bit of apple or sugar given him to eat. Horses are very susceptible to kindness, and can be persuaded by this means, when the most severe punishment would only result in exasperating and exciting them.

Sometimes very slight causes will tend to make a horse balk; it may be produced by fright or by the collar not fitting well; by its pressing more upon some parts of the shoulder than others; sometimes from the coldness of the collar; or the load may be too heavy, or the shoulder sore. It is most frequently caused, we believe, by improper treatment while the horse was being broken, and the tendency once acquired, it is not easily cured. Whatever may be the cause, there is one thing that should be remembered and observed in such cases, and that is, *never whip a balky horse*. A writer on the subject says in a work entitled, "*The Horse and His Diseases*:"

"This species of restiveness is one of the most provoking vices of the horse, and it can be successfully combated only by a man of the most imperturbable temper. The slightest sign of vexation only increases the evil, and makes the animal more and more troublesome each time that he refuses his work. Many a thick-headed, quick-tempered driver flies into a passion and beats or otherwise abuses his horse on the least symptom of balking, until the animal becomes utterly worthless from a confirmation of the habit.

As a rule, it may be stated that horses balk from nervousness or unsteadiness of disposition; if not, indeed, from an over-anxiety to perform their work. Nervous well-bred horses are more susceptible to the influences which induce balking, than are cold-blooded.

more indolent ones. A high-mettled horse, when carelessly driven, will start suddenly against his collar, fail to start his load, draw back from the pain which the concussion causes, rush at it again, and again draw back, until it becomes impossible for his driver to steady him in his collar for a dead pull. If to all this be added a smart cut with the whip, and a fiercely-spoken word—with, perhaps, a blow over the nose, or a stone in the ear—every fear or vicious feeling of the horse will be summoned into action, and the animal will become entirely unmanageable, requiring to be left for an hour or two in his position, before he gets sufficiently calm to be induced to move. There may occasionally be a horse which cannot be made to draw steadily by the most careful treatment, but the cases are exceedingly rare in which gentle treatment and firmness, a patient persistence in mild, authoritative command, and judicious coaxing, would not either prevent the formation of the habit, or cure it when formed.

To cure the habit of balking is not an easy matter, and it is possible only by the kindest treatment. If the horse shows fear by his excited manner, or, by looking about him wildly, that he is expecting a blow, you may be sure that he has received hard usage under similar circumstances, and that he must be convinced by caresses and kind words that you will treat him gently. You must recollect that the horse cannot understand your language, and that while he is confused, he will misinterpret every sign which you may make to him. He must feel confidence in your kind intentions, whether it takes an hour or all day to convey it to him, before you can do anything to cure him of his trick.

If you have him harnessed to a light wagon on a smooth road, where it will afford but little resistance, you may, by repeated trials, convince him that it is a simple, easy matter to draw it; and you should continue to exercise him from day to day with the same light load, and afterward increase it gradually, until you have trained him to a quiet manner of starting, or of going up a hill, or elsewhere, where he has been accustomed to balk."

Another writer gives the following sensible advice: "Almost any team, when first balked, will start kindly if you let them stand five or ten minutes, as though there was nothing wrong, and then speak to them in a steady voice, and turn them a little to the right or left, so as to get them both in motion before they feel the pinch of the load. But if you want to start a team that you are not driving yourself, that has been whipped and otherwise mismanaged for some time, go to them and hang the lines on their hames, or fasten them to the wagon, so that they will be perfectly loose; make the driver and spectators (if there are any) stand off some distance to one side, so as not to attract the attention of the horses; loosen the check lines, so that they can get their heads down, if they choose; let them stand a few minutes in this condition, until you see that they are a little composed. While they are standing, you should be about their heads gentling them; it will make them a little more kind. When you are ready to start, stand before them, and, as you seldom have but one balky horse in a team, get as near the front of him as you can, and, if he is too fast for the other horse, let his nose come against your breast: this will keep him steady, for he will go slow rather than run on you; turn them gently to the right, without letting them pull on the traces, as far as the tongue will let them go; stop them with a kind word, gentle them a little, and then turn them back to the left, by the same process. You will have them under your control by this time, and as you turn them again to the right, steady them in the collar, and you can take them where you please.

There is a quicker process that will start a balky horse, but not so sure. Stand him a little ahead, so that his shoulders will be against the collar, and then take up one of his fore feet in your hand, and let the driver start them, and when the weight comes against his shoulders he will try to step; then let him have his foot, and he will go right along. If you want to break a horse from balking, that has long been in that habit, you ought to set apart a half a day for that purpose. Put him by the side of some steady horse; have check-lines

on them; tie up all the traces and straps, so that there will be nothing to excite them; do not rein them up, but let them have their heads loose. Walk them about together for some time as slowly and lazily as possible; stop often and go to your balky horse and gentle him. Do not have any whip about him, but keep him just as quiet as you can. He will soon learn to start off at the word, and stop whenever you tell him.

As soon as he performs right, hitch him in an empty wagon; have it stand in a favorable position for starting. It would be well to shorten the stay-chain behind the steady horse, so that, if it is necessary, he can take the weight of the wagon the first time you start them. Do not drive but a few rods at first; watch your balky horse closely, and if you see that he is getting excited, stop him before he stops with his own accord; caress him a little, and start again. As soon as they go well, drive them over a small hill a few times, and then over a large one, occasionally adding a little load. This process will make any horse true to pull.

When we remember that we are dealing with dumb brutes, and reflect how difficult it must be for them to understand our motions, signs, and language, we should never get out of patience with them, because they don't understand us, or wonder at their doing things wrong. With all our intellect, if we were placed in the horse's situation, it would be difficult for us to understand the driving of some foreigner, of foreign ways and foreign language. We should always recollect that our ways and language are unknown to the horse, and should try to practice what we could understand, were we the horse, endeavoring by some simple means to work on his understanding rather than on the different parts of his body. All balked horses can be started true and steady in a few minutes' time; they are willing to pull as soon as they know how, and I never yet found a balked horse that I could not teach to start his load in fifteen, and often less than three minutes' time.

In the first place, never teach your horse to balk, by giving him a greater load than he can carry, or requiring him to go up too steep a hill without permitting him to stop. If you tell him to stop, in going up a steep hill, it is better than to allow him to do it of his own accord. If he finds he can stop of his own will, and start when he pleases, he will soon learn to do it when he ought not to. If at any time he stops without your stopping him, give him a sharp cut, and make him go on, even if you think he ought to stop at that very place; but soon yourself give him an opportunity to stop. This will teach him that he is to stop only at your will, and that you are not unreasonable in your demands."

**Use of the Check-Rein.** — It is very true, as a certain author has said, that "the horse has to work very hard for his living, and he has a right to be so harnessed as to do his work in the way most easy to himself." If, in drawing a heavy load, a horse has his head held back in an unnatural position by a check-rein, he cannot throw his weight into the collar, and give his body that position that will enable him to use his strength most advantageously. If any one doubts this, let him attempt to draw a heavy load himself, with his head held back by a stout strap attached to a belt about his body in such a manner that he cannot bend forward, but must of necessity maintain an upright position. In England, Ireland, and Scotland it is a very rare thing to see a check-rein used upon a draft horse, while in the United States it is quite too rare to see a horse without one.

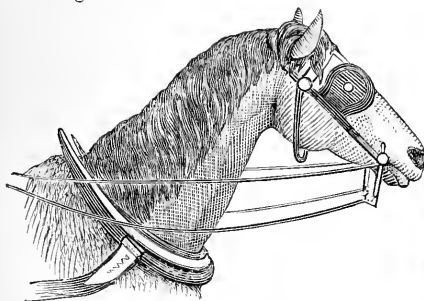
The tight check-rein is not only painful to the horse, but no good results to the driver from its use, except in case of a horse being vicious and unmanageable; he may then be more easily controlled. A horse with his head drawn back in an unnatural position by the check-rein not only has his power to draw lessened, but cannot as well see where to step, and is more liable to stumble, while if he does stumble he cannot as readily recover himself. A tight check-rein has also a tendency to produce disease, injures a horse's mouth, and frets and worries him. The effects of its use are described as follows by John A. McBride, Professor of Veterinary Medicine and Surgery in the Royal Agricultural College: "I will briefly consider the effects of the check-rein, — (1) upon the circulation of the blood; (2) upon the veins; (3) upon the arteries.

1. *Its effects upon the circulation of the blood.*—It will appear very evident that this contrivance must seriously interfere with the return of blood *from* the brain, and thus lead to an accumulation of venous blood, producing eventually a state of coma, the severity of which will depend upon the duration and intensity of the compression; and, further, it must impede the flow of arterial blood *to* the brain. This deficiency of arterial blood is characterized by a want of nervous sensation, and a disarrangement of the nervous parts.

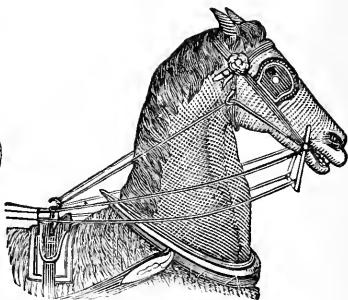
2. *Its effects upon the veins.*—The sudden, intermittent, and violent muscular action of the neck, together with pressure of the lower jaw, would induce more or less permanent distension of the veins, which in all probability would ultimately become varicose.

3. *Its effects upon the arteries.*—The pressure of the blood within the vessels, and the unnatural muscular contraction of the neck, would lead to laceration of their inner coats, resulting in enlargement of the vessels, and thus form aneurisms.

The consequences of the above conditions would lead to increased pressure upon the nerves of the neck, causing pain to the animal, and, further, it would predispose the unfortunate victim of fashion to such diseases as megrims, apoplexy, coma, inflammation, and softening of the brain."



NATURAL POSITION.



UNNATURAL POSITION.

Youatt says: "Roaring is an unnatural, loud, grunting sound, made by the animal in the act of breathing, when in quick action or on any sudden exertion; it is manifest unsoundness, as impairing the function of breathing. Among other causes of it, is that which the folly, as well as cruelty, of man has introduced—the system of tight reining."

The leading veterinary surgeons of Europe and America denounce its use, both on humane and sanitary principles, and its continued use seems to be simply to conform to the caprice of fashion, regardless of the consequences.

The overhead check is fully as objectionable in all respects as any other, while it produces a very awkward carriage in a horse, since the neck and head are kept drawn back unnaturally high, while to relieve the neck the horse throws his nose out, giving him a gait about as graceful as that of a camel.

Whenever the check-rein is used at all on the horse, it should be made so long that he can drop his head when going up hill, as far as he would without one. It is to be hoped that farmers and horse owners generally will give this subject more attention, and look upon it in its true light. The logic of the old Scotch stage-driver on this point could not well be controverted, when he said, "We dinna use 'em. You winna get half their power with 'em crimped up so."

**Frosty Bits.**—Never put a frosty bit in a horse's mouth. If iron bits are used in severe weather, always warm them by putting them in water, holding them in the hands a

moment, or by some other means, rather than cause the animal so much suffering as would be incurred by inserting a frosty bit, which will be liable to result in not only pain at the time, but a sore tongue and mouth which will be constantly irritated, sometimes rendering it difficult to eat the food given them, causing loss of appetite and consequent loss of strength.

The use of the India-rubber as well as the leather bit is to be recommended during the cold season, since they obviate the evil effects of iron or steel in frosty weather.

**Blinders.**—These are not only a useless but an objectionable appendage to a bridle, and are without doubt in many cases the cause of diseased eyes and blindness. Besides, a horse is more apt to take fright when he can get only a partial view of an object, than if he could obtain a full view of it. Sudden or loud startling sounds, like those from a locomotive, would be much more likely to frighten a horse when his eyes are so blinded that he cannot tell from whence the sounds proceed. A nervous, timid horse would naturally think it something terrible in pursuit of him, and run to get away from it, and a serious accident might be the result, while if he could see the object, this might be avoided. A recent writer has well said of blinders:—

“We know not who invented this instrument of horse torture, but we know he did not understand the anatomy and physiology of the eye of a horse. Human vision is binocular—that is, we see the same object with both our eyes, and so adjust the axis of vision that the object appears single, though seen with two eyes. But the eyes of the horse are placed on the sides of the head, and the axis of each eye is nearly at angles with the longitudinal line of the body, so that it is impossible that the same object can be distinctly seen by both eyes. Now, by blinding the eye in the direction in which it was intended, in its construction, that it should see, it is forced to use an oblique vision, as if we should cover the front of our optics and be compelled to see only by the corners of our eyes. This unnatural and constrained use of the eye must, to a greater or less extent, impair vision, if not entirely destroy it. The object for which the blind-bridle is used is not accomplished by it. A horse is more readily frightened when he cannot see the object of his dread, than if he can have a fair view of it. Nineteen out of every twenty horses you see in harness have blind-bridles on, and if you ask the owner to explain its benefits, or why he uses it, he will be utterly unable to give a rational answer.”

**Clipping Horses.**—The advocates of this practice claim it to be a means of promoting the general health of the animal, and a prevention of colds and lung fever, also that it increases, at the same time, his activity and appetite. The main advantage claimed for it is, that when a horse with a heavy coat has been driven in cold weather sufficient to cause his hair to become wet with perspiration, and as soon as he halts is liable to take cold, even when immediately blanketed, since the hair remains wet so long; that clipping and keeping the animal blanketed, except while being driven, will obviate the evil.

The opponents of clipping, on the other hand, assert that it is not only cruel, being the cause of much unnecessary suffering from insufficient protection against the cold, but that it is equally injurious to the health, frequently producing disease and death. There may be instances, and doubtless are, where horses may receive such careful attention that clipping will do no injury, and by this means they may be enabled to perform more labor and with greater dispatch than when unclipped; but we are of the opinion that Nature's method is best, and when she gives him a fine, short summer coat that lies smoothly upon his skin, and a heavier and coarser covering for winter, she knows better than man what is best for the animal.

Besides, very few horses when clipped are sufficiently well protected to be furnished with a fair substitute for the coat that has been removed, the hood and blanket only covering the head and upper portion of the body, while the under portions and limbs are entirely exposed.

But few clipped horses are provided with a protection for the head, the only covering commonly used being a blanket, so that, even under the most favoring conditions, clipped horses must of necessity suffer more or less from exposure, while, with the common treatment received from careless and indifferent drivers, much injury must result from clipping. It is true that a horse will be more active, and have a more voracious appetite after being clipped than before, but whether this is a healthful indication may be doubted. All animals that are not sufficiently protected from the cold will require a greater amount of food to be kept in good condition, than those that are kept comfortably warm. This is a fact with which every one is familiar.

Now, if by removing the coat we increase the demand for food, thus unduly stimulating the digestive organs, and taxing them to furnish a supply of fat and heat sufficient to compensate for the loss of the covering, the question naturally arises, Will not the extra labor required of the organs of digestion have a tendency to produce disease? And can it be truly a promoter of health?

Again: since clipping has a tendency to increase the activity of a horse, the keen air exciting him and greatly increasing his ambition to go, there is great liability of clipped horses being driven beyond their capacity for endurance, while at the time, there may be no indications of it; and we believe that clipped horses, as a rule, are generally over driven, to say nothing of the results from exposure to colds and other evils from lack of care afterward. That clipped horses really suffer from the cold, need not be questioned by any one who has ever been at all observing in noticing the shivering of the animals on being exposed to the cold atmosphere, after their blankets are removed.

It is the opinion of some of the most intelligent veterinary surgeons, that many diseases are directly traceable to clipping, among which are those resulting from exposure to the cold, the shock occasioned by severe changes in the weather, and over-exertion. The evil effects of clipping may not always be perceived at once, some being gradual in their development. Several cases of string-halt have come to the knowledge of the writer, which were indisputably the result of clipping. Clipped horses are, of course, much more easily taken care of than those unclipped, since they require less grooming to be kept clean; for this reason indolent grooms are very apt to favor the practice, whatever the result to the horse. It is stated by high authority, that inflammation of the lungs has become a prevalent disease among horses since the custom of blanketing them constantly in the stable was introduced. There is no doubt that this practice causes greater sensitiveness to the skin, and increased liability to take cold, than when the blanket is only used as a covering after profuse sweating, or when the animal is standing exposed to the weather.

Where a well-bred horse is put in the stable before cold weather commences, and is well groomed and kept blanketed except when being used, his coat will be about as short as in summer, or at least short enough for appearance, and to admit of drying off readily when sweaty. The coat of a horse that has been clipped does not come out as evenly in the spring as one that is unclipped, and rarely looks quite as well afterward. Never trim the hair at the heels much, if at all. The hair inside the ears should never be cut, nor the long hairs or feelers about the eyes and nostrils; they were designed by nature to be of great utility to the animal.

**Stables, and Stable Management.**—The stables for horses, and, in fact, for all animals, should be in a healthy location, free from dampness, and with plenty of pure air. They should also be on the sunny side of a building, if practicable, for the sunlight has a healthful and stimulating effect.

The stalls should be roomy, with partitions sufficiently long and high to prevent the horses from kicking, or biting each other. Some recommend having the partition so high that they cannot see each other, but we do not favor this, as horses are social animals, and

enjoy the company of others. Box-stalls, where the horse can be free from the halter, and also exercise a little, are greatly to be preferred. Horses that are worked hard every day would, we believe, last much longer if they could, when out of harness, have the entire freedom of large box-stalls. The stables should be kept clean, and well ventilated. Horses possess a very acute sense of smell, and greatly dislike offensive odors. Besides, the breathing of air freighted with the odors of excrement, both liquid and solid, and carbonic-acid gas generated from the lungs of the animals in breathing, is very injurious to the system. It poisons the blood, and is the cause of many diseases.

The ammoniacal vapors of ill-kept stables produce inflammation of the eyes, and irritate the throat and lungs, so that blindness, cough, or asthma may be the consequence. Glanders is more frequently caused by breathing the impure air of stables than by contagion. The drainage of stables should receive particular attention, and the arrangement for the manure should be such, whether in pits or otherwise, that the foul odors from it cannot affect the air of the stable. The floor of a stall should be as nearly level as practicable and admit of drainage, for if it slopes much there will be a liability of lameness by straining the ligaments and membranes. The slope should not exceed two inches.

The litter under the horses' feet should be kept dry and clean. Standing on hot, fermenting manure will cause the hoofs to become soft, and will produce lameness. A sufficient amount of light in the stable is indispensable to the health of a horse. No animal can thrive for a long time in a dark stable. Horses that are kept in dark stables will also be more liable to shy when brought out suddenly into the light; but this is of minor importance compared with the injury caused the eye from having this sudden change from darkness to bright sunlight. The sight by this means becomes in time impaired, which frequently results in total blindness.

While dark stables are to be avoided, the opposite extreme of a glare of light is equally objectionable, as far as the effect upon the eye of the horse is concerned. The stables should be so arranged that the light from the windows will not shine into the faces of the animals, or fall upon the eyes from the front, but rather from the rear or side. A strong reflected light should also be avoided. It is well to have the interior of the stables colored with a neutral tint to the distance of seven or eight feet from the floor, to avoid the glare that would be occasioned by a white wall throughout.

We have previously said so much respecting the necessity of pure air for mankind and animals, that a repetition here is unnecessary. All stables should have ventilators so constructed that the foul air can escape, and the pure air find an unobstructed entrance. Great care should be taken that in securing good ventilation the animals are not exposed to a draught of air. When the stables are not occupied, the doors and windows should be left open, if the weather will admit. The stables should be kept as comfortable for the horses as possible, both winter and summer.

As a glossy coat is supposed to be produced by a very warm stable, many grooms sacrifice ventilation to this idea, and not only keep the stable too warm, but poorly ventilated. In a warm, and properly ventilated stable, we doubt whether blanketing is desirable, but in cold stables, where horses will not be sufficiently warm without this protection, it may be found necessary. Where blankets are used as a covering for horses in stables, a moderate temperature and moderate amount of clothing will be better than a low temperature and an undue amount, or a high temperature and slight clothing. About 55° Fahr. is estimated to be a good mean, or desirable temperature for stables.

The feet and legs of the horse should receive good care, as these are the first to fail, and are subject to the greatest number of diseases. After severe or protracted exertion, a horse should be rubbed down dry. The legs should be well rubbed with the hand, which will tend to prevent swelled legs, stiff joints, contracted tendons, etc. When the legs are of an

unnatural heat from over-driving, bandaging with wet cloths will reduce the feverish temperature, and prevent wind-galls.

Horses that are not used for work should have some exercise every day. Always use the curry-comb lightly, for the skin of the horse is very sensitive, and rough usage in this respect will cause him much nervous irritation and pain. When tied in the stall, the halter should be sufficiently long to admit of the horse lying down in a comfortable position, yet at the same time care should be used that it be not so long as to permit him to get his foot over it, and thus be thrown down and get cast. Serious results sometimes follow carelessness in this respect.

**Feeding.**—Improper feeding is the prolific cause of disease in horses, especially to those used upon the farm, and for draught. Horses should always be fed regularly, and in such quantities as will keep them in good condition. Horses that work hard will require nearly twice the amount of food that an idle horse does, other conditions being equal, while, of course, a large horse will need a much larger amount than a small one. The amount of food required will therefore depend upon the size of the animal, and the amount and kind of work performed by him. Enough food should be given under any circumstances to supply the waste of the system.

Due regard should also be had to age and constitution, as well as to size and the amount of labor performed. It is estimated that horses that work require about two per cent. of their weight as a daily allowance of food. From fourteen to sixteen pounds of grain, and the same of good hay, is regarded as a generous allowance for a hard-working horse of large size. The American cavalry horses are allowed about fourteen quarts of oats, and an equal amount of hay, and are fed three times a day. The English cavalry horses have a little less, which is an allowance of ten quarts of oats and twelve pounds of hay, three times a day.

It is very desirable to have a horse a "good feeder," but some horses are gluttons, and in such cases it is not well to give them all the food they will crowd down. A light feeder is apt to be a tender animal, and lack endurance.

Grain of some kind should always be given horses that work hard. Hay or grass alone is not sufficient to sustain a horse that labors hard, because there is not sufficient nutriment in either to supply the waste, while a horse that has his stomach distended with such coarse, bulky material as hay alone, is in no condition to work, providing it met the demand of the system. When worked hard, the food should be chiefly oats, with some hay; when not working, less grain and more hay may be fed, or the feed may be chiefly hay, with a moderate quantity of oats or other grain. Oats seem to be the natural food of horses, and are to be preferred to any other kind of grain. They supply more nourishment and flesh making material than any other kind of food. Barley is also good. Corn is rather heating, and should never be fed alone. It is best when ground, and given in connection with other food. New corn should never be fed to horses in large quantities, as it affects them very injuriously; many valuable animals have been lost by eating soft corn. New oats and new hay should not be fed in connection, and never in large quantities, but should be mixed in part with that which is old.

Roots are excellent for horses, when being fed on dry food. Carrots are the most valuable roots for this purpose, and many horsemen feed regularly with them in considerable quantities, they taking the place, in part, of the grain rations.

A ration of one-half carrots and one-half oats is thought to be equivalent to a full ration of oats, while it has been found that horses that perform but little work will keep in good condition on hay and carrots alone. Raw potatoes given occasionally, as well as apples, are also very beneficial. The former are especially valuable for horses troubled with worms. The English feed beans in connection with oats and hay to hunters, and horses that work hard. Beans are heating, and should be given only in small quantities, and never regularly.

Bran and linseed are used also for special purposes,—sometimes as a substitute for regular feed, and sometimes in addition to it.

Poor hay or damaged corn should never be given to horses. The latter will bring on inflammation of the bowels and skin diseases. Cut hay is much better than that which is not cut. Hay sprinkled with water in which a little salt has been dissolved is much relished by horses. Cut hay moistened with warm water makes a good feed for them. When meal or bran is fed, it is a good plan to mix it with moistened, cut hay. Oats moistened with water are preferred to dry, being more easily masticated and digested. A warm mash is good for horses, especially after a hard day's work, which is made by turning boiling water on bran and stirring it until it is well moistened.

A horse should not be driven hard or put to hard work for an hour or more after eating. The custom of most farmers of taking a horse immediately from his feed to hard work is very injurious. Violent exercise in man or beast should never be taken until digestion has, at least, been partially accomplished. A working horse should also have an hour's rest at noon. A horse designed for rapid work should not be allowed much hay at morning or noon, but grain principally. At night he may be given a larger quantity of hay in connection with grain.

The evening before a long journey, an extra amount of food should be given. Time will thus be allowed for its digestion and extra nourishment will be obtained for the extra labor to be performed.

While on the road, it is always well to feed in small quantities and often, rather than to overload the animal's stomach after a long fast, attended with great exertion and weariness, which would be liable to produce staggers, or apoplexy. When a horse refuses food and water, he is in no condition to be driven. Never feed a horse much when he is heated and exhausted. Give him a little wet hay, and a few sips of water, and after he is rubbed down and cooled off, he may have his usual drink and rations.

**Watering.**—Horses that are allowed free access to water will drink little at a time and often, and where stalls are so arranged that a constant supply of pure water can be had at any time, we believe such horses will be kept in much better condition than those that are watered at long intervals, and frequently stinted in the supply, or drink too large a quantity, from the thirst produced by long abstinence. Where horses are stinted in water, a feverish condition of the system will be liable to be the result, together with a loss of condition.

Where horses do not have free access to water, they should be watered four times a day. The old idea of stinting horses in water is not only unreasonable and injurious, but cruel; being fed upon dry hay and grain, they require drink often, and in sufficient quantities to quench thirst. The plan of permitting horses to have access to water at all hours in the stall is meeting with much favor at present, and experience thus far proves that it is highly beneficial, and to be recommended, where practicable.

Spring or well water is not generally as good for horses as that from ponds and streams, as it is generally hard and cold, they much preferring soft water, and that which is slightly warm. It is not a good plan to allow a horse to become accustomed to drinking very warm water, for if obliged to drink cold water at any time it will be liable to cause colic. Never allow a horse to drink freely when heated. Permit him to take a few sips only to cool his mouth, rub him off until he is dry, first with a wisp of straw, and then with a brush, rubbing his legs also well with the hand. When cool, give him his drink first, and then his food. When on the road, always let him drink whenever he likes.

The water given horses should always be of the best quality. Horses are peculiarly sensitive respecting the water they drink, and are easily made sick by impurities. The pail, tank, or other receptacle for the water should always be kept very clean; in fact, the water given horses should be as clean as that used by the household for drinking purposes. They should never be driven hard immediately after eating or drinking freely.



"DRACO PRINCE." Time, 2:25½  
Owned by J. R. Poot, Somerville, Mass.



**Grooming.**—While horses that are constantly used on the farm or in draft and exposed to the weather do not require very much grooming, carriage-horses and those that are stabled a portion of the time require considerable care in this respect. The *Agriculturist* contains the following sensible hints on this subject, by T. L. Nevill, which so fully coincide with our own views that we give them in his own language:—

“Good grooming is essential for preserving a horse's health and appearance. A fine coat and tender skin should not be touched with the curry-comb, but be brushed very gently. If there are any urine or dung stains, let them be washed, using a sponge deftly, so as not to extend the wet dirty place. By making this the first operation the wet spots have time to dry, while the other parts of the work are being done.

If a curry-comb must be used, have the smoothest one that can be found, and use it but sparingly. In the hands of some men the curry-comb is a barbarous instrument of torture. Applied with a long, sweeping motion, without regard to the shape of the body, or the evenness with which it is held, it will make a poor animal shrink and shiver. The skin is often seriously hurt by the angles of the comb, when carelessly and heavily handled. A short motion, back and forth, does the work more effectively and humanely than the severe application of the comb described. The horse will learn not to dislike it, if he finds he is not hurt.

In cleaning a horse, commence at the head with the brush, having it in one hand, and the curry-comb in the other. Brush every part of the body and limbs thoroughly, laying the hairs in their natural direction, and going through them to the skin. Remove dust from the brush by occasionally scraping it on the curry-comb. The brushing is to be followed by a good rubbing with wisps, and the coat finally laid by the application of a cloth. A thorough cleaning of the head cannot be effected without removing the halter, and be careful not to hurt the eyes, or other sensitive parts.

The mane and tail have now to be combed. If the hairs are knotted, go through them, taking a small lock at a time, straightening and separating the whole. When once properly done, there will be but little trouble afterwards. Sometimes a very thick mane has to be turned over the neck to get at the underside. No two hairs are to be left sticking together. Some short ones may stick up obstinately on the wrong side. If so, damp them with a sponge and try to bring them into place with the brush. If very rebellious, they must be plaited, and a small bit of lead twisted in the ends to bring them right.

Sometimes a horse with very abundant mane will come up from grass with it hanging on both sides of the neck. Do not allow any *knowing* groom to cut it off from one side. If this is done it will soon present a bristly, unsightly appearance, that will take months of growth to cure. A little patience, careful combing, wetting, brushing, and perhaps plaiting and leading of these thick manes, will soon bring them into place, and make a wonderful improvement in the horse's appearance. A portion of the mane on the poll should be cut away to allow the bridle to sit snugly, and to prevent the formation of a bristly tuft.”

**Hints on Driving, and Draft.**—Never use a horse for work of any kind when sick or lame. All horses should have some exercise every day, since exercise promotes a healthy circulation of the blood, and imparts vigor to the whole animal system. In driving, do not keep up a constant talking to the horse; he will soon learn to pay no attention to what you say. Quiet drivers are always the most successful ones. Never trust your horse entirely to himself, but keep your hand steady on the reins, just sufficient to feel his mouth with the bit. This will obviate accidents from stumbling. By being thus on your guard you can best prevent shying or the accidents that may be caused by it or sudden fright. By this means you keep the animal's attention without irritating him.

There is a vast and important difference between a tight check-rein and a moderately-tightened rein, although not generally understood. The first is injurious in many respects, and may make a horse stumble from not being able to see where to step, and also prevents

him from recovering himself well when he does stumble. But the latter is a steady support to the head given by the hand of the driver. Avoid a constant hard pull on the bit, for it hardens the horse's mouth and pains and irritates him.

Never pull up suddenly and sharply unless it is necessary, because this is not only painful to the horse, but tries his chest, neck, and fore-legs. Do not acquire the foolish habit of continually jerking on the reins, or using the whip. The first injures and hardens the horse's mouth; besides, he will not know what is really meant when both reins and whip are used in earnest. Be careful to see that the horse's collar fits well and causes him no irritation. Ill-fitting collars or those that are too tight are the cause of much injury to horses. The following, from the "London Horse Book," contains much truth and may serve to call the attention of those who have been indifferent and careless in this respect:—

"A horse-collar is frequently looked upon as merely a ring for the neck, to which the traces are to be affixed; whereas, there is no part of the harness which is so important and which ought to fit so accurately. How often is a little collar only fit for a pony jammed on the neck of a much larger animal, so that every pull he makes must give the feeling of strangulation, and that will in all probability cause some kind of fit if long continued, besides its liability to gall and wring the poor animal's shoulders. When this has taken place, the work *cannot* be fairly performed; and to do it at all, the anguish of the poor horse must be indescribable."

A badly-fitting collar will also frequently cause horses to balk that are otherwise perfectly docile and easily managed.

In using the saddle, the same care should be exercised to see that it is sufficiently large and bears evenly on the horse's back. A saddle that is too small or does not fit well will chafe and gall the horse most painfully.

The wheels of the vehicle should be kept well greased. This not only saves much of the wear occasioned by constant friction, but renders the draft much easier. It is estimated that well-oiled wheels save one-half the work of draft. In taking a long journey drive slowly at the beginning and near the end, increasing the rate of speed between the two extremes; this permits him to get warm and cool by degrees, which is always the best method. Never stop long in cold, wet, or windy weather, and never in any weather when the horse is warm and sweaty without putting a blanket over him as a protection against taking cold.

When stopping on going up a hill, always block the wheel with a stone, otherwise the whole weight of the wagon and load are drawing on the collar, straining his limbs and back and preventing him from breathing well. Always let a horse have water often when being driven, and in moderate quantities. Never allow him to suffer thirst. Never throw water on his limbs when he is warm. Never overload an animal at any time. This is not only cruel and unjust to the horse, but equally unprofitable to yourself. Always so harness the horse and arrange his load that he may be able to use his strength to the best advantage. Give him the free use of his head, discarding check-reins and blinders, and see that his collar and harness fit well, are properly adjusted, and will neither cramp, chafe, nor irritate him.

There should always be a suitable proportion between the horse and the vehicle. The shafts should be neither too high nor too low, but nearly on a level in draught, though sloping slightly upwards. The horse draws in a level line, and the shafts and traces should therefore be nearly level.

Horses should not be long used without being fed. Nose-bags are very convenient to put the feed in during the intervals of rest when out in the field at work. There should be leather or other durable material at the bottom, in order to retain the food well, while above they should be of open texture or porous, to permit the animal to breathe freely. Something should be given the horse to rest it upon in order to eat at the bottom, otherwise he will be,

obliged to keep tossing it up for nearly every mouthful, which gets the dust, etc., into his eyes and nostrils.

The feet of horses should be examined every night after work, to ascertain whether any stone may have worked its way between the shoe and hoof. If so, it should be removed at once, as lameness will be produced, if it is allowed to remain there over night. In all cases in the care of animals, it is well to remember that they are susceptible to pain, weariness, hunger, and thirst, as well as mankind, and to consider how we should like to be treated were we in their place.

## HORSE-SHOEING.

**T**HE foot of the horse is inclosed in a horny case called the hoof, which corresponds to the nail or claw of other mammals. The fore part of the hoof is the thickest, it being about half an inch in thickness, and gradually growing thinner towards the back. Near the heel it curves inward, forming what are called *the bars*. These are a prolongation of the wall of the hoof, and their object is evidently to protect the frog, and strengthen the foot generally.

In the natural state of the foot, the bars are quite prominent; but in horses that have been improperly shod, they are sometimes scarcely to be seen, having been cut away under the mistaken idea that this mutilation is essential in shoeing a horse. The outer portion of the hoof is called *the wall*; it furnishes support to the body, and gives protection to the internal parts. The front of the wall, or crust of the hoof, is called *the toe*, the hindmost part *the heel*, and the intermediate parts *the quarters*. In the middle and back part of the foot, within the bars, is an elastic, horny substance of triangular form, or rather like a sharp-pointed V with the point turned towards the toe. It occupies about one-fourth of the sole, and is called *the frog*. Its use is to form a kind of elastic cushion on which the horse's foot rests, and which greatly reduces the tremendous shock and force of the jar occasioned by the hoof striking the hard ground, or pavement. When at rest, and with every step, the natural foot, unshod, permits the frog to rest upon the ground, the frog at the same time pressing directly upon the navicular joint, and the tendons which are beneath it.

It evidently corresponds to the elastic, epidermic pads on the soles of the feet of such animals as the lion, tiger, camel, dog, cat, etc. The great mistake made by ignorant farriers, in cutting away this important part of the foot, can readily be seen, when once its use and importance are considered.

*The sole* is that part of the foot which has a nearly plane or slightly concave surface, and extends from the frog to the wall of the hoof. It is horny and hard, yet, at the same time, somewhat elastic. The outer or non-sensitive portion of the sole protects the inner portion from injury, as it comes in contact with the ground, and also aids the wall in supporting the weight of the horse. The sensitive portion of the sole, lying next to the outer or non-sensitive, aids the horse in traveling, through the sense of touch, so that he can place his foot on the ground in such a way as to favor it. It also furnishes the outer sole with material for its growth or replacement, when worn away.

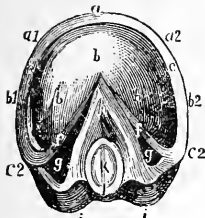


FIG. 1. — HORSE'S FOOT.

The above cut shows the ground surface of the hoof prepared for receiving a shoe; and marks very distinctly the difference between the curvature of the outer and inner quarters. — *a*, the toe—rasped away to receive the turned-up shoe; *a1*, the inner toe; *a2*, the outer toe; *b1*, the inner quarter; *b2*, the outer quarter; *c1*, the inner heel; *c2*, the outer heel; *d*, the sole; *e*, the crust or wall of the hoof; *f*, the bars; *g*, the commissures; *h*, the frog; *i*, the part immediately under the navicular joint; *k*, the oval cleft of the frog; *l*, the elevated boundary of the cleft; *m*, the bulbs of the heels.

The internal structure of the hoof is illustrated on a previous page in this department, in connection with **THE PASTERNS** (which see). At birth, the foot of the colt is in form more like a cloven than a solid foot, the sides being folded or rolled together under the sole. The hoof is soft and fibrous, but soon hardens, and grows rapidly. It, however, wears off quite evenly, as to general appearance, but more at the toe than elsewhere, especially on gravelly soils or stony pastures, giving the foot of a year-old colt a proportionately large frog with prominent bars, as seen in Fig. 2.

Col. M. C. Weld says, in the columns of the *American Agriculturist* :—

"Time makes few changes in the general form of colt's feet up to the age of four, when they begin to be handled by farriers. I suppose, if my pastures had not been so stony, I would have been obliged to rasp off the feet now and then to keep them regular, but as it was, I saw no occasion to do so. One thing I have noticed which has interested me much. It is this: as the weight of the animal increased, the quarters showed a weakness, and notches of greater or less extent were worn at each side of the hoof at the 'quarters,' just in front of the bars. So marked was this in some cases, that the foot lost its round look altogether, and appeared much like Fig. 3 when seen turned up.



FIG. 2. — COLT'S FOOT.  
AT TWO YEARS.

It seems that Nature gives great prominence to the bars. It is they which form the inside buttresses to the walls of the foot; and against them the horn grows so tough and strong, that natural calks, as it were, are formed. In our shoeing of horses we disregard some of the plainest and broadest hints given by Nature, for, instead of setting the heel-calks where they are set by Nature, we extend the shoe out behind the heel, and place the calks back of the foot.

The naked foot at the bottom is flattish, somewhat saucer-shaped, rounding up at the edge in front, and much rounded up at the heels, so that when set down in trotting, the heels strike first, and the foot *rolls* forward upon the flat foot; and when picked up *rolls* forward upon the toe. When walking the foot seems to be placed flat upon the ground, but the rolling motion is observed when it is picked up. How distressing, then, it must be to the horse to have all this natural roll done away with by the sharp-edged or calked shoes.



FIG. 3, SHOWING QUARTERS.

It is clear to me that the formation caused by the bars, and the toughness of the horn where the bars are attached, give horses sure footing upon slippery and rocky places. The frog gives surer footing upon the ice, as it is of so soft a nature that it clings to the smooth surface — just as a person slips less upon the ice if he has on india-rubbers."

The hoof is somewhat elastic, and when the weight of the horse is thrown upon it, the softer cushion, or frog, presses firmly upon the earth; consequently, it aids very materially to prevent slipping on the ice, besides giving support to the foot, when it is not cut away in shoeing. Wild horses seem to have hoofs sufficiently strong to support the body without artificial protection; but when used in constant service, on hard roads and stony pavements, it has been the custom in all civilized countries to furnish a protection to the foot, and after many experiments, iron was found most serviceable for this purpose. Horse-shoeing was introduced into England by William the Conqueror, and has since that time been generally regarded as a necessity; but within a few years public attention has been directed, to a certain extent, by writers in both Europe and America, to the importance of doing away entirely with shoeing, and permitting the foot to remain as nature formed it, unmailed and unshod, whatever the service, or the character of the foundation upon which it may rest. A medium between the two extremes of shoeing and bare feet, is the use of "tips," which

serve as a protection only to the forward part of the hoof, which is most subject to wear, while the other portion remains in its natural state.

There is no doubt that many of the diseases of the feet, and much of the lameness in this locality, is due principally to improper shoeing, and the cutting away of the bars, frog, and sole,—those portions designed by the Creator as a protection and support to the foot of that truly majestic and wonderful animal,—the horse.

If horses are to be shod, it is of the highest importance that the shoeing be performed in such a manner that this process shall prove a benefit, rather than a detriment to them, and the shoe serve as an added protection to that already given by nature, instead of cutting away and mutilating the natural supports, and substituting a poor one in their place. There is no department of horse management that requires so much discretion, and the exercise of such good, sound judgment as shoeing, and yet there is, at the same time, no part of horse management that is, as a general practice, so badly performed, and in which there is so little skill and good sense displayed as in shoeing; ignorance and obstinate stupidity being the rule with those that perform this business, rather than the exception.

We are glad to know that there are exceptions to be met occasionally. Shoeing, when necessary, may justly be regarded as a necessary evil, and too much pains cannot be taken by the blacksmith in preventing the many ills resulting from faulty work of this kind.

When an unshod hoof that has never been tampered with rests upon an even, hard, unyielding surface, the portions that maintain the weight are the edge of the crust all around, and the frog. Where the surface is uneven, the sole, being slightly concave, sustains a portion or the whole of the weight, according to the degree of unevenness of the surface, caused by stones, frozen clods, etc.

On ordinarily level roads, the hoof wears quite evenly in traveling, but where the surface is uneven or gravelly, the toe will wear away faster than the other portions. "Tips," or the "half-moon shoe," made thin and nicely fitted, will protect this portion of the hoof in such cases, and permit the frog to rest upon the ground, as it always should.

A shoe, of whatever style, should always be so fitted that it will permit the frog to rest upon the ground, and the frog and bars should *never* be cut; simply let them alone, as nature formed them, and never permit a stupid blacksmith to cut and mutilate your horses' feet after the barbarous fashion so commonly seen. The sole should not be cut, and the crust or wall of the hoof should only be cut sufficient to make the shoe fit well, and to reduce it to the form and length to which it would naturally wear away if unshod, as the hoof will continue to grow when protected by the shoe, and will require slight paring on this account.

The wall of the hoof should not be made thin and weak by rasping. The shoe should never extend outside the crust of the hoof; if it does, there will be danger of interfering or cutting. If the calks on the toe of the fore feet are too large, or the hoofs too long, there will be a liability of the horse throwing his hind feet against the heels of the sole of the fore feet in trotting, since, when thus shod, the fore feet will not naturally be placed as far forward, within an inch or two, as they would otherwise be, and over-reaching will generally be found to be caused by such improper shoeing, and remedied by correcting this evil.

It would be a very rare thing indeed to find a horse accustomed to go unshod, to interfere or over-reach. Fleming, one of the best writers on this subject, recommends the following pattern of shoe:

"If the sole of the hoof has not been mutilated by the knife, it does not require to be covered by the shoe, as Nature has furnished an infinitely better protection. Wide surface shoes can, therefore, be at once dispensed with; and a narrow shoe—made of the very best and toughest iron, adapted for traveling on slippery roads, and for aiding foot and limb, and sufficient to withstand wear for four or five weeks—is all that is required. We will therefore conclude that the upper or foot surface should be the whole width of the shoe, and

plane,—not beveled,—for we have seen that the sole was destined, particularly at its junction with the wall in front, to sustain weight. We also know that it is advantageous to the whole foot and limb to allow the sole as wide and general a bearing as possible, so that one part may relieve the other; the sole coming to the aid of the wall, and the frog interposing to share the fatigue imposed upon both, as well as to relieve the strain on the hinder parts of the foot, flexor-tendons, and limb, and keep a firm grasp of the ground by its elastic and adhesive properties.

The shoe applied to the foot, then, should have its hoof-surface flat, in order that it may sustain the wall and as much of this strong portion of the sole as its width permits. This is contrary to the usual practice, which only allows the wall to rest on a narrow surface, and bevels off the remainder of the shoe to prevent contact with the sole. Many years' experience of this plain foot-surfaced shoe in various regions of the globe, and on feet of every kind and quality, has proved the soundness of this view. The foot is brought as near to a state of nature, when the greater part of its plantar surface supports the weight of the body, as man can hope to achieve while submitting the horse to an artificial existence.

A light, thin shoe is always preferable to a heavy, thick one; as the narrowness of the metal insures a good foothold,—in this respect imitating the wall,—while its thinness brings the sole, frog, and bars in closer approximation to the ground."

Miles recommends that the frog, except in very rare instances, should never be cut or pared. He says: "The first stroke of the knife removes this thin, horny covering altogether, and lays bare an under surface, totally unfitted, from its moist, soft texture, for exposure, either to the hard ground or the action of the air; and in consequence of such unnatural exposure it soon becomes dry and shrinks: then follow cracks,—the edges of which turning outwards form rags; these rags are removed by the smith at the next shoeing, whereby another such surface is exposed, and another foundation laid for other rags; and so on, until at last the protruding, plump, elastic cushion, interposed by nature between the navicular joint and the ground, and so essential to its preservation from injury, is converted by the mischievous interference of art into the dry, shrunk, unyielding apology for a frog, to be seen in the foot of almost every horse that has been regularly shod for a few years. The frog is provided within itself with two very efficient modes of throwing off any superfluous horn it may be troubled with; and it is very unwise in man to interfere with them: the first and most common is the separation from its surface of small bran-like scales, which, becoming dry, fall off in a kind of whitish scurf, not unlike the dust that adheres to Turkey figs. The other, which is upon a larger scale, and of rarer occurrence, is sometimes called "casting the frog." A thick layer of frog separates itself in a body, and shells off as deep as a usual paring with a knife; but it is worthy of remark that there is this very important difference between the two operations: nature never removes the horny covering until she has provided another horny covering beneath, so that, although a large portion of the frog may have been removed, there still remains a perfect frog behind, smaller, it is true, but covered with horn, and in every way fitted to sustain exposure; while the knife, on the contrary, removes the horny covering, but is unable to substitute any other in its stead. My advice, therefore, is to leave the frog to itself; nature will remove the superfluous horn, and the rags can do no harm, and if unmolested will soon disappear altogether."

**Lafosse's System of Shoeing.**—Lafosse, the noted French veterinarian and author, recommends the following method of shoeing:

"To prevent horses slipping on the dry, glistening pavement—*paré sec et plombé*—it is necessary to shoe them with a crescent-shaped shoe,—that is, a shoe which only occupies the circumference of the toe, and whose heels gradually thin away to the middle of the quarters, so that the frog and heels of the hoof bear on the ground, and the weight be sustained behind and before, but particularly in the latter, because the weight of the body falls heaviest

there. The shorter the shoe is, the less the horse slips; and the frog has the same influence in preventing this than an old hat placed under our own shoes would have in protecting us from slipping on ice.

It is necessary, nevertheless, that hoofs which have weak walls should be a little longer shod, so that the gradually thinning branches reach to the heels, though not resting upon them. For horses which have thin, convex soles,—*pieds combles*,—these long shoes should be also used; and the toes should be more covered to prevent the sole touching the ground: at the same time the shoe must be so fitted that it does not press upon the sole, and the heels and frog rest upon the ground. This is the only true method of preserving the foot, and restoring it. . . . A horse which has its heels weak and sensitive ought to be shod as short as possible, and with their branches—*éponges*—so that the frog comes in contact with the ground; because the heels, having nothing beneath them, are benefited and relieved.

Crescent shoes are all the more needful for a horse that has weak, incurvated quarters, as they not only relieve them, but also restore them to their natural condition. Horses which have contusions at the heels—*bleimes*, corns—should also be shod in this manner; and for cracks—sand-cracks—at the quarter it is also advantageous. *The sole, or frog, should never be pared*; the wall alone should be cut down, if it is too long. When a horse cuts himself with the opposite foot, the inner branch of the shoe ought to be shorter and thinner than the outer. 'In order that the shoe wear a long time, I have used a nail of my invention, the head of which is in the form of a cone, and the aperture in the shoe of the same shape, and exactly filled by the nail. However much the shoe may be worn, it is always retained in its place.

This kind of nail possesses three other advantages: one, that it is less liable to be broken at the neck, because it exactly fits the stamped hole; the other, that it is smaller, and, in consequence, not likely to press on the sensitive part of the foot; and, lastly, that it does less damage to the horse."

In another connection, he recommends shoeing horses kept for general service, as follows:—"The shoes must not be too long, or project beyond the heels, but only reach the bars; neither must the hoofs, behind or before, be pared. The wall, or crust, alone should be diminished in proportion as it may be too long. This should be done evenly; and neither the sole nor frog must be cut: the latter should be allowed to project, if possible, above the shoe, so that it may come into contact with the ground. The shoe ought to be about the same strength throughout, or a little thicker and wider in the outer branch of the fore-foot, and thin at the heels of the hind one. Be careful to stamp the nail-holes on the same line, not in a zigzag manner. The holes should not be too coarse, as there is then danger of pricking the horse, or binding the hoof with the stalk of the nail.

The shoe should be stamped coarser outside than inside, because it may be necessary to leave it wider outside. Do not bend the shoes in adjusting them, nor arch them: they ought to be nearly flat; though they might be slightly curved, so as to preserve the wall of the hoof. They should also follow the outline of the hoof,—a little more to the outside than the inside. When fitting, the shoe should not be kept too long a time on the hoof, for fear of heating it. With this shoeing we may travel on slippery ground or grass land, in using for each shoe two nails with long heads, which will prevent the horse from slipping. Also during frost, on paved roads, ice, or snow, use these nails, as they prevent slipping; the roads being hard, three nails are required; two in the outer branch, and one in the inner.

These short shoes, thin at the heels, have caused the horses to walk on their frogs, which are their points of support; and those which were lame at the heels are sound again; those also whose inside quarters were contracted, bent over, and split (sand-crack), have been cured. It has been the same with horses whose quarters and heels have been contracted (*encastelé*): these have been widened, and have assumed a proper shape. The same may be said of those

whose soles were convex (*combe*), and which went lame with long shoes. My method has also preserved those horses which had a tendency to thrush (*vulgo, fic*) and canker of the frog (*crapaul*)."

**The Goodenough Shoe.** — This shoe is made upon the principle that the proper way to shoe a horse's foot is to permit the frog to rest upon the ground; the inventor, whose name it bears, having this idea of frog-pressure in mind, succeeded in producing a shoe that has been extensively used and highly recommended by the best authorities on farriery.

It is stated by those who have become most familiar with its use, that corns, quarter-cracks, thrush, shrunken frogs, contracted heels, and many other of the evil effects of improper shoeing, have been cured by the use of this shoe alone, without any other application.

This shoe is always applied *cold*, and is fitted by cutting out just enough of the crust to have it fit in well, being imbedded as it were in the crust, and leaving the sole and frog as much exposed as possible, neither of which are ever cut. It is a very light shoe with five calks or bearings, a lower surface similar in form to the natural foot, and is bevelled on both surfaces, the nail-holes being counter-sunk.

Mr. Russell, present Secretary of Massachusetts Board of Agriculture, says of this shoe: "My reason for using the Goodenough shoe was because it kept the principle continually before the man who was shoeing, and enabled him to shoe the horse with frog-pressure. The heel of the Goodenough Shoe is drawn thin. It is a rolled shoe, and it is rolled thin. The shoe is also bevelled on each side. It is bevelled on the foot-surface, the part of the shoe that goes against the foot; so that the bearing of the horse comes upon the outer wall of the hoof entirely. It is bevelled on the inside, which prevents the balling of snow, or suction in mud; which is a very important matter. And then, in rolling up, it is corrugated. There are three depressions in which the nails are counter-sunk, so that the heads of the nails do not strike the ground until the shoe is very well worn down. Any man who will take the pains can shoe his horse in the same way without the use of any special shoe for that purpose."

**The Charlier System.** — This is an improved French method of shoeing horses, and consists simply of a little rim of iron put about the hoof, set in a groove, so that the whole bottom of the horse's foot, frog, bars, sole, and all, comes upon the ground the same as if the animal were barefoot, the shoe serving as a protection to the rim or crust of the hoof. This mode of shoeing makes a very nice job, requiring the best workman to execute it satisfactorily, and would doubtless prove too expensive to become generally adopted in this country.

**Shoe Tips.** — These are a narrow, thin, crescent-shaped protection for the front portion of the hoof, which is that part most readily worn away. They leave the sole, bars, frog, quarter, and heel entirely untouched, the hoof having no artificial protection except at the front, as previously indicated. They are highly recommended by those who have used them, and approach the nearest to bare feet of any method of shoeing. Mr. Murray says of them: —

"They are a most excellent form of shoe. I speak from experience, and not from theory alone. I have used horses of eleven hundred pounds weight, in farm-work and ordinary family service, on the road, for months together, with no protection to their feet save these tips, and found that their feet, which, at the beginning of the experiment, were in a most unsatisfactory condition, grew strong and well; and I recommend this form of shoeing to all my readers whose horses are exercised or worked in the country. Indeed, I am under the impression that the feet of many horses would need no other protection even for city service. It is astonishing how fast the foot will develop and increase when once brought in contact with the ground. Take off those high-heeled shoes from your horse, friend, which you have

caused to be put on him in order to keep his frog from the ground, and let it come in contact with the ground at every step. For a few days, or even for a few weeks, your horse may favor himself somewhat; but Nature will soon accommodate herself to the new liberty granted her; viz., the liberty of helping herself. She will soon build up a frog, such as you never saw in your life,—a large, overlapping pad of gutta-percha-like substance, wide and thick, that feels no more the concussion, when brought in contact with the stone pavement, than the buffer under a railroad car feels the jolts as the train is being whirled along."

Mr. Russell, previously quoted, says:—"A horse condemned to wear heavy shoes to which heel and toe calkins are affixed, begins to fail from that moment. At the age when he should be in the fullest enjoyment of his strength, he is called old. And few of our horses live out half their days, the great cause of their decline being from disease of the feet; all of which are caused by ignorant shoeing. In the management of colts on a farm, they should not be shod until they come to rapid and long-continued labor on hard roads; and then the lightest possible application of iron should be made. The safest way is to let the hind-feet be bare, and to shoe the fore-feet with tips or crescents of iron that only cover the toe. It must be borne in mind that the frog is the natural level of the horse's foot, and the hoof must be trimmed, keeping that ever in view."

Mr. E. F. Bowditch, of Massachusetts, gives his method of shoeing, as follows:—"My way of shoeing is to get a level bearing on the horse's foot, and keep the frog on the ground; never have any heel or toe calk, except when it is absolutely necessary in winter. The last winter, I rode my saddle mare (and of course my neck is worth more to me than anything else I own) on glare ice, with a small bit of iron, about four inches long, curled around her toe, and with a very small toe-calk. I recollect galloping out on the ice, where the men were at work cutting it, and I had no fear of her slipping, although the horse that was marking the ice, that had calks on two inches high, did slip."

Mr. Bowditch further states that he established a little forge on his own farm for his own protection, and because he could not get a blacksmith to do as he wanted him to do. They did not believe in light, three-quarter round shoes, and Mr. B. did; and where horses have had their feet abused for many years he would use nothing but "tips," *leaving the heels entirely bare*. In reference to preparing the foot for the shoe, he says:—

"One great thing is to take off as little as possible. You merely want to cut a little bit off of the edge where your shoe is going; so that, when you have got your iron on, the frog will be sure to come down, and take the jar on the foot. No matter if there is a large flake which stands off; leave it there, for it may save the horse from getting hurt when going down hill. There may be a piece of iron in the road (a nut, as happened in one case to myself), and, if the horse steps on that, it may lame him. That flake is dead: it is worn off on the road, and sometimes drops off in the road or in the stable."

He never touches the "frog" in any way, no matter how ragged; and is also very careful not to touch the "bars" unless they strike before the shoe, when he would shave off a little. In reference to a case where the frog had shrunken up into the foot, and the benefits of a frog-bearing in such a case, he says:—

"It will benefit the horse if that method of shoeing is kept up; I know that by experience. I very often have cripples come to my forge; and, when they get to going well, they go back to their own blacksmith; their owners do not think it worth while to bring them to me. When the little mare called the 'corpse,' that I drive, came to me, her heel was about an inch and three-quarters wide, and her frog was the size of my little finger. Now she has a frog that fills up almost the whole of her foot. . . .

I have been interested in shoeing horses for several years, and I never have had any trouble with my own horses' feet from the effects of shoeing. Nine hundred and ninety-nine thousandths of all the trouble in horses' feet come from shoeing; in fact, practically all.

To illustrate: this 'corpse' that I speak of, that I drive fast down hill occasionally, belonged to a friend of mine, and was in the knacker's yard to be killed. She was to be killed because the doctor who had her in charge wanted her legs as specimens of inflammatory rheumatism. I asked my friend, as a favor, if he would let me take her, because I did not think she had inflammatory rheumatism, and I would like to try and cure her; and, if I did not succeed, the legs should go to the veterinary, who wanted them as specimens. I had to bring her sixteen miles; and it took me eight hours, with a man leading her, and a boy behind switching her; and, as they express it in the country, 'every leg was in front of her.' She had a little shrivelled frog. I cut her hoofs very low indeed, until I got a little bit of frog-bearing; but it hurt her to put her foot to the ground. The frog had no life in it, no circulation. About two months after I took her, I thought I would try her, and see if it was inflammatory rheumatism. She took her eighteen miles in an hour and a half, although she was a little lame. I was satisfied she would come out perfectly sound. To-day I am driving that mare. She has never had her frog off of the ground since I had her, winter or summer. Her heel is steadily growing wider, and her frog is growing every day. I have driven her, within the last fortnight, from Boston to my farm, some twenty-three miles. I can do that with this little mare in an hour and forty minutes, and repeat it the same day in an hour and forty-five minutes, and she will not go lame a single step. She will go in the middle of the road, and step on stones without flinching."

The instances already given are sufficient to prove the evil effects of faulty shoeing, and the best method of remedying them.

**The Best Method of Shoeing.**—That shoeing is undoubtedly best which consists in taking away as small a portion of the natural support of the foot as possible, without cutting the frog bars, or sole, and at the same time giving increased strength and protection, leaving the foot free to maintain those points of support that in a state of nature it always has; in fact, the nearer we follow the natural form and tread of the foot, the better.

Shoes should never be worn longer than four or five weeks without being removed, as contraction of the hoof and corns will be liable to be the result, if resetting is neglected longer than this period.

**Barefooted Horses.**—Although the shoeing of horses has long been common in most of the civilized portions of the world, still there are many parts where horses are permitted to go year after year without shoes, even on rough roads, and under such conditions are said to remain sound, being less troubled with lameness and diseases of the feet and limbs than where shoeing is practiced.

The attention of some of the leading writers on horse management has for a few years past been directed towards the benefits to be derived from dispensing with shoes altogether, and permitting horses to go unshod. They claim that more evil than good results from shoeing; that it is entirely unnecessary, and that if horses could be allowed to go unshod, great benefit would be derived. The opponents of the practice claim that horses used on hard pavements, or in constant service on common country roads, will soon become tender-footed and lame from the wearing away of the hoof, and also that such horses would be liable to serious injury from slipping in freezing weather.

It is a well-known fact that there are hundreds of horses used—unshod—with success in London over the pavements of stone, wood, and asphalt. This method, if practicable, would certainly save the farmer considerable expense for shoeing during the year. There is no doubt that much of the lameness of horses results from improper shoeing, and that when lame from this cause, one of the best remedies in such cases is to remove the shoes, and permit the animal to run in the pasture awhile, or, if in winter, he should be allowed the exercise that a large box-stall affords; also the yard, when the weather will admit. Horses that

have been accustomed to wear shoes should not have them removed, and be put at once to hard work on rough roads, for this will be liable to make them tender-footed. The hoof will also be apt to split and break. If, in such cases, the animal could be turned into a pasture on damp soil, or where there is wet grass, for a few days, the hoofs will become softened, when they can be trimmed or rasped off evenly. If put to hard work before the nail-holes—or those portions of the wall that have been split or weakened by them—are worn off, there will be a liability of the hoofs being further injured.

It would be well to give horses that have been accustomed to wear shoes, the protection which tips afford for a time, until the hoofs become hardened, if they are to be put to much service.

Probably some horses have had their hoofs injured to such an extent by bad shoeing and nailing, that more time would be required to permit the hoof to become repaired by the natural process, than could be profitably spared by the owner. The quality of the hoof differs with different horses, some having much harder hoofs than others. The only way to tell whether a horse's hoofs are tough or tender is to test them thoroughly after the broken and damaged portions are removed or worn away.

A Western gentleman of large experience with horses says:—"We have long been convinced of the folly of keeping horses shod the year round, and at present we allow all of our horses to go barefoot most of the time, and some of them are constantly on the road, and most of the time on paved streets. We keep our horses shod only during the rough and slippery roads of mid-winter. If farmers could save a part of their blacksmith bill, and at the same time improve their horses, it would be a decided gain."

Col. M. C. Weld—a high authority on all that pertains to horse-management—gives his practice as follows:—"With me it is a great desideratum to have my horses shod as small a part of the year as possible. They are surer-footed; their feet are in better order; they travel freer on short journeys—I have not tested them on long ones; they do not injure one another by kicking, and it is a saving of expense. In fact, considering the number of ailments brought about by bad shoeing and poor blacksmiths, and the number of horses hopelessly ruined by this means, and the fact that there are parts of the world where the roads are even rockier and rougher than ours, where the art of farriery is unknown, and the horses are all driven and ridden barefoot, that we in the country ought to do the same, and let our horses go barefoot just as much as possible."

We doubt whether horses would be benefited by going entirely without shoes the year round in those latitudes where ice forms during the winter, although many who have tested the plan assert its practicability, but we do believe that the majority of horses might go unshod with benefit during a large portion of the year, and it would be to the advantage of farmers and horse-owners generally to have less iron and steel, and more common sense, employed in the management of their horses' feet.

**Results of Improper Shoeing.**—Faulty shoeing, as previously stated, is the cause of many of the ills which horses are obliged to endure, good shoeing being the exception rather than the common practice. Among the many evils that result from improper shoeing may be mentioned the cutting away of the bars and frog, thus weakening the support and protection of the foot; the thin paring of the sole, which removes the protection of the inner sole from both the ground and the atmosphere, making the horse tender-footed, and causing the natural moisture of the hoof to become absorbed by the atmosphere, until it becomes dry and cracks. Then there is the breaking off of the walls of the hoof by the nail-holes, the drawing of the nails too tightly, the use of the rasp in making a groove for clinching the nails; the cutting and filing of the edges of the hoof that project beyond the shoe; the opportunity of foreign substances, such as stones, gravel, or earth, becoming wedged between the shoe and sole; the uneven pressure of the shoe on different portions of the sole; the

searing of the hoof to make the shoe fit better; the uneven growth of the hoof sometimes seen when the shoe is left on too long; the injury to the hoof in removing nails, and from driving them into the sensitive portion of the sole in fastening on a shoe. Sometimes the nail splits in driving, and one thin blade of iron goes into the sensitive portion of the foot, and the other through the wall. Instances of lock-jaw have been known to occur from this very cause. In order to have the foot look round, and give it a finished appearance, some stupid blacksmiths rasp the wall of the hoof, thus weakening it and causing it to become brittle and crack, it not being sufficiently strong, under such treatment, to support the weight of the body, and the concussion produced on hard pavements and rough roads.

Much injury is done the hoof by the violence and carelessness often connected with removing a shoe, thus breaking and tearing portions of the wall. These and many other evils might be mentioned as the direct result of improper shoeing. Blacksmiths cannot take too much pains in informing themselves respecting the best modes of shoeing, or in the practice of their art when it is thoroughly understood.

**Brittle Hoofs.**—There is a great difference in animals with respect to the quality of the hoof,—some being of a soft, porous nature, others hard, firm, and capable of enduring much wear, and the extremes of heat and cold, drought and moisture, without being apparently affected by them. The quality of the hoof is transmitted with just as much certainty as that of any other characteristics, some breeds or families of horses invariably having large flat feet and hoofs of an open, porous nature, while others—such as the Arabian breed, for instance,—have a small, narrow hoof of the firmest, toughest, and most compact quality. This is not only true of breeds, but of individuals; the quality of the hoof of the parent determining largely that of the offspring. Aside from the difference in quality, there are conditions that affect and modify the character of the hoofs of horses, long-continued warm, dry weather having a tendency to cause the hoof to become brittle, while moisture or dampness has the opposite tendency. Improper shoeing, as previously stated, will cause the worst form of brittleness of hoof. Imperfect nourishment will also affect the quality of the hoof, as well as the hair, and cause it to become dry and brittle in character.

The *National Live Stock Journal* contains the following on this subject: "It is not habitual dryness that injures; it is the alternation of rain and drouth. The evil effects of moisture may be largely warded off by smearing the moistened foot with some impervious, oily agent before exposing it to the drying process. In this way the moisture that has been absorbed by the horn is retained, the sudden drying and shrinking are obviated, and the horn remains elastic and comparatively tough. As it is often needful to soak the foot in warm or cold water, or in poultices in cases of disease, it is all-important that the above-named precaution should be constantly borne in mind, and that the softened foot should be smeared throughout with some hoof-ointment before it is allowed to dry and harden. For this purpose nothing is simpler or better than a mixture in equal parts of wood-tar and whale-oil or lard. This may be smeared on the foot every other day.

In addition to the changes of weather, the frequent standing in rotting dung-heaps, or in pools of decomposing liquid manure, may be named as causes of brittle hoofs. In the dung-heap there is not only the moisture and steam soaking and softening the hoof, but there is abundance of ammonia-gas, which is especially calculated to soften, dissolve, and destroy the horn. Rotten manure and putrid liquids, therefore, are much more injurious than pure water, muddy pools, or wet clay. Again, the emanations of this kind are far from conducive to general health, so that they prove hurtful in two ways—first, by directly destroying the substance of the hoof, and, secondly, by reducing the animal vigor, the power of digestion and assimilation, and the power of secreting good horn. Standing in such decomposing organic matter is still more injurious, however, when the animal is confined to a stall or box, for here the injurious effect of inactivity is added to the above-named conditions.

Not the least among the causes of brittle hoofs is disease of the foot. And this may result from injuries inflicted at a distance, as well as from those acting directly on the foot. Of the first class are especially to be named *founder* from an over-feed of grain, or a drink of cold water when heated and fatigued. In both instances the trouble begins with the stomach and digestive organs, which become congested and irritated by the indigestion, or the reaction from the chilling effect of the cold; the irritation extends to the skin; and the foot, being that part of the skin which is most abundantly supplied with blood, and most sensitive, is the most severely affected. Such inflammations of the foot may be so severe as to cause shedding of the hoof, extreme distortion of the hoof, or merely drying, hardening, shrinking, contraction, imperfect nourishment, brittleness, and loss of substance.

The same result sometimes follows on an overdose of purgative medicine, which, primarily, irritates the stomach and bowels, but, secondarily, implicates the skin and feet by sympathy.

The perfect integrity of the hoof is only to be obtained in the progeny of a good stock, in which health, growth, and vigor have been persistently secured, by suitable food, air, exercise, and general care; all inflammation or other diseases of the foot must be carefully guarded against by a most watchful attention to this part alike in shoeing, stabling, and exercise. When a foot has suffered in any way, whether from drying after excessive moisture, from long standing on a dry floor, from freezing in cold weather, from over-driving and concussion, or otherwise, the irritation should be relieved by a soothing application, like a poultice, or a standing place in wet clay, in warm or in cold water, to be followed in every case by a daily, or, at least, a frequent, use of a hoof-ointment. It may be added that the growth of the horn may be hastened by a tar or turpentine ointment, or by the application of a weak solution of cantharides—one part of powdered cantharides to 25 or 30 parts of alcohol—around the hair at the top of the hoof. When a good firm horn is wanted, this must never be applied so as to induce severe inflammation, which would increase the production of horn, but only of an open, unresisting quality of the same, ready to yield or break under tension or concussion.

Gentle daily friction, or the application of the above preparation, as often as may be necessary to keep up a free flow of blood to the part, is all that is required. In very weak, brittle feet there is often an advantage in applying a leather sole beneath the shoe, with a layer of tar and tow between it and the sole. This obviates concussion, and favors growth. Again, broken parts of the wall may sometimes be temporarily repaired by filling the breach with a mixture, in equal parts, of gutta percha and gum ammoniac. This will give some support to the part, and a more equal bearing to the shoe, until the hoof-wall has had time to grow down anew."

Stopping the feet frequently will obviate brittleness of the hoof, which is sometimes caused by the horse being seldom or irregularly worked, and kept most of the time in a dry stable.

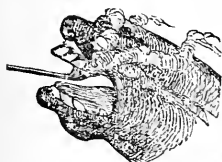
**Stopping the Feet.**—This consists of filling the entire under portion of the hoof with some substance that will serve to impart moisture to the foot. It will always be found beneficial when the hoofs are dry and brittle, or when there is any tendency to feverishness in the feet. For horses that are confined much of the time in dry stables, this process is almost a necessity, but too often neglected in stable management. Some writers on horse management claim that the feet of all horses should be stopped as often as every other night. The best material for this purpose, and what is always convenient to obtain, is fresh cow-manure, mixed with one-fourth part of clay. Either wet clay or cow manure alone are also highly recommended for the purpose. Wet oakum and linseed-meal are also very good. Yonatt recommends, in case of wounds, cow-manure with a fourth part clay beaten into it, and a little tar added, but says that the use of tar in a common stopping is too stimulating

and drying. The stopping should be always carefully removed before the horse leaves the stable for use.

**Lampas.**—This is very improperly considered a disease by certain ignorant farriers, and the brutal practice of burning down the bars with a hot iron is frequently resorted to as a remedy. Lampas is a swelling of the bars of the mouth, and is found in all colts to a greater or less extent, and occasionally, though rarely, in old horses, since the teeth of the horse continue to grow during his entire life. Sometimes the swelling extends to a level with the edge of the teeth, and even beyond them. This condition may be produced from inflammation of the gums when the colt is shedding his temporary teeth, or from some feverish tendency in the system. It frequently occurs when a young horse has been taken from grass and fed on grain. Over-feeding, with insufficient exercise, will also sometimes cause it. Generally, this difficulty requires no treatment, and, if left to itself, the swelling will soon subside. But when it interferes with the mastication of the food,



LAMPAS IRON.



it will be well to lance the gum or bars of the mouth, the bleeding of which will reduce the inflammation, the lancing to be performed where the most inflammation exists. This may be done with a lance or a common pocket-knife, by making a few slight incisions across. Sometimes the cutting of the tushes and grinders will produce the swelling in the mouth, and when this is the case—which can readily be determined by examining the localities—the gum should be lanced over the tooth, the same as children's gums are sometimes lanced in teething. Warm mashes should be given at such times.

Horsemen recommend that, after lancing, the mouth be washed with a solution of tincture of myrrh, two ounces to a pint of water, or a solution of alum and water, this to be repeated twice a day for three or four days, during which time bran mashes or flax-seed gruel, with a small quantity of new grass, should be given. Also, that no hay, oats, or corn be given for a week, after the expiration of which time the teeth will be in condition to masticate such food.

**Treatment of Old or Disabled Horses.**—A horse that has served his master faithfully many years is justly entitled to kind and considerate treatment in old age. It is too frequently the case that after a horse becomes advanced in years, and his usefulness somewhat impaired, he is sold to some unscrupulous person who will either over-work and otherwise ill-treat the faithful creature, or who will sell him to some one of a numerous class of men who are too poor to own a good horse, but who for a few dollars will purchase an old or otherwise partially-disabled animal, and get all the work he can out of him, at the same time keeping him with the least possible expense. There are already too many of these abused, half-starved creatures to be seen in every city and town, the sight of which, more than almost anything else, strikingly impresses one with a sense of man's inhumanity.

The selling of the faithful, patient old farm-horse to a sharp-eyed jockey is frequently done in a thoughtless manner by many a kind-hearted farmer, who, if he would stop to reflect a moment upon the suffering this act of his would bring upon the noble animal, would refuse to do it. There is another class of farmers to whom the few dollars that such a sale would bring in return would far outweigh the feeling of gratitude or conscience in the consideration, and to such we suppose this appeal in behalf of the faithful old horse would be futile; but we hope and believe this class to be in the minority, and the nobler elements to largely predominate. He who will cause by his act, or permit cruelty to be perpetrated upon any of the creatures God has given us, is himself guilty, nearly, if not fully, to the extent of him who perpetrates directly the cruel act, since he either causes or permits what he

might easily prevent, and is therefore responsible. No horse should be made to labor beyond his strength, at any age, and all horses are entitled to kind treatment and good care. When a horse becomes so old or otherwise unfitted for service that it does not pay to keep him, and the owner feels that he cannot afford to keep him simply for the good he has done, or has not sufficient affection for him to still care for him after he ceases to be paying property, let him be humanely killed by a rifle-ball shot through the brain, rather than sell him to be abused and wear out the remainder of his life in suffering and neglect. Old horses should be fed much with warm mashes, oats, and cut feed.

Carrots are especially good for old horses, to the extent that they have been very appropriately called the regenerator of old, worn-out horses, as well as those that have been overworked, poorly fed, and otherwise improperly treated. Such horses when allowed a generous diet of carrots, in connection with other food, will gain in condition very rapidly. They will soon put on flesh, and the coat become materially improved. Carrots seem to supply horses with new blood, and thus restore their youth for a time. Horses are very fond of them and will eat them greedily. If fed upon them in large quantities for a long time, however, the effect is lessened, as the body becomes accustomed to them, and the result is less marked. Care should be used while thus feeding to give the animal sufficient exercise, as there will be a tendency to apoplexy where this is neglected, and such stimulating food long given in large quantities.

**Care of Harnesses.**—Harnesses that are constantly surrounded with the fumes of ammonia will become stiff and hard, as the ammonia will have a tendency to absorb or eat up the oil contained in the leather. For this reason nice harnesses should never be hung where the ammonia from the air of the stable will reach them. A harness-room or closet should be done off in the barn or wagon-house for the purpose, which will also keep them free from dust. The walls should not be whitewashed, as the lime, coming in contact with the leather, would injure it. Long pegs or hooks should be fastened in the wall about six feet from the floor for hanging the harnesses on. Two hooks will be sufficient for one harness, one for the bridle and collar, the latter hung with the small end up and outside the bridle, and the other for the harness, which should be hung by the saddle. By this arrangement they are hung in proper order for putting on the horse.

On taking the harness from the horse, the dust and rain or perspiration should all be wiped off with a piece of chamois skin, or woolen cloth. When nearly dry, the portions that were damp should be again rubbed with another cloth or chamois skin kept for the purpose, until they are soft and pliable. The plated mountings and bits should be cleaned by rubbing with a cloth slightly oiled. Harnesses require occasional special cleaning and oiling in order to prevent the leather from becoming stiff and hard. They are more injured by use and require more care in summer than in winter, as they are more frequently soaked by the rains, wet with perspiration from the horses, and subjected to heated and dry atmosphere. If kept well oiled, the injurious effects of these conditions may be in a great measure obviated.

**How to Clean and Oil a Harness.**—There are various methods and applications employed for cleaning and softening harnesses, the most common of which is to first wash with soap and warm water, followed by rinsing in clear, soft water, and afterwards apply oil; neats-foot oil being generally used. Another method is to oil the harness well, by which means the dirt on it is softened, after which wash it thoroughly with soap and water, and rinse it as before, afterwards applying some one of the many preparations for the purpose, which will both oil the leather and improve its color. By oiling before washing, the oil penetrates the leather and prevents the water from saturating it and making it hard. Castor oil is highly recommended by some for this purpose. A preparation of equal parts of oil and tallow, colored with lamp-black and a small portion of Prussian blue, makes a very good application

for harnesses after they have been washed and dried. Castor oil will endure the effects of the atmosphere and moisture much longer than neats-foot oil, and when used will not require applying as often. A mixture of equal parts of castor and neats-foot oil is frequently used.

*Le Bourellier et le Sellier*, a French work, gives the following recipe for restoring old and stiff leather:—Melt over the fire, in a metallic vessel, eight pounds of very pure beeswax, stirring it until it is all melted; then introduce one pound of litharge, which has been pulverized in water, dried, and passed through a fine sieve. Leave it on the fire, and stir it until all of the soluble part of the litharge is incorporated with the wax; remove the vessel from the fire, and when the mixture shall have lost a portion of its heat, incorporate with it, little by little, one pound and a half of very fine ivory black of the best quality; replace it on the fire, and stir it incessantly until the wax commences to boil again; then remove it and allow it to get nearly cool. Then add to it spirits of turpentine, until it is of the consistency of a paste. More turpentine may from time to time be added, as may become necessary.

**Cleaning the Plate.**—When tarnished, the plate of a harness may be cleaned by rubbing with common whiting for polishing silver. If badly tarnished, rub first with whiting wet with soapsuds, afterwards with dry whiting. No acids should be used; it will be liable to destroy the plate. Steel mountings should be kept bright by rubbing with a cloth containing a very little sweet oil, never enough to be perceptible on the surface of the steel.

**Treatment of Sick Horses.**—As soon as a horse is discovered to be sick he should be placed apart from others, both for his own welfare and that of other horses that may be stabled with him, as contagious diseases may be communicated by the confined air of the stalls. The sick animal should have warm, airy, and well-ventilated quarters, which should be kept scrupulously clean. He should also be provided with a good, soft bed of clean straw or leaves. He should be handled very gently, and always approached in a quiet manner, avoiding all unnecessary noise, or anything that would have a tendency to disturb or irritate him, for sick animals, like sick people, like to be quiet and undisturbed, and are equally affected by irritating causes. Good nursing and simple remedies are much to be preferred for sick animals, as well as for sick persons. Never use a horse that is not well. If he refuses his food, or seems ailing, he is in no condition for work.

**Diet for Sick Horses.**—This will depend much upon the nature of the disease, the degree of development, its intensity, etc. Rush recommends that "in acute diseases no food whatever be given until improvement has taken place, and even then only in a sparing manner; the articles of diet most suitable are bran, oats, hay, carrots, Swede turnips, and green food, either grass or clover. The bran may be given either dry or wet, whichever way the animal prefers it. Oats may be given mixed with bran, either raw and crushed or whole and boiled. It may be necessary to keep the animal without food and water for a half hour before and after administering medicine." A warm mash of bran is excellent, also boiled flax-seed, potatoes, either raw or boiled, and a few sweet apples.

**Pulse of the Horse.**—It may not be known to all having the care of horses that the pulse of the horse can most conveniently be felt close to the junction of the head with the neck, in the lower jaw, a little back of where the sub-maxillary artery and vein, and the parotid duct come from under the jaw. The ordinary number of pulsations in a common farm horse in temperate climates is thirty-six per minute, while that of the thoroughbred will be from forty to forty-two. It is somewhat increased by hot weather, and greatly so by a hot climate.

It is stated by reliable authority that the pulse of a thoroughbred horse will be about ten degrees higher in New Orleans than in New York. The ordinary practice of feeling the pulsations of the heart through the sides determines only the number of beats in the minute, while by that of the jaw, as described, determines not only this, but the manner in which the blood passes, and the quantity.





### INTERNAL STRUCTURE OF THE HORSE.

To aid in a better understanding of the internal structure of the horse, we give the above view of the longitudinal section showing the thorax (cavity of the chest, windpipe, etc.), abdomen, pelvis, etc., the intestines and liver being removed. The explanation of the illustration is as follows: 1. The occiput forming the back part of the head. 2. The smallest division of the brain or cerebellum. 3. The front or principal part of the brain called the cerebrum. 4. The cartilage between the nostrils, nasal membrane. 5. The tongue. 6, 6 Joints, articulations of the neck bone. 7, 7, 7. The spinal cord or marrow. 8. Pharynx, the cavity into which the mouth and nose open, and which is continuous below the oesophagus. It is surrounded by the membranous and muscular walls beneath the base of the skull. 9, 9. The passage, oesophagus through which the food and drink go into the stomach. 10. The entrance of the stomach, passing through the diaphragm; the diaphragm is the membrane separating the thorax from the abdomen shown in the cut by the curved line. 11. The orifice of the stomach, pylorus, through which the food passes into the intestines. 12, 12. The inner surface of the membrane (diaphragm) which separates the stomach and bowels from the heart and lungs; this membrane also assists in the act of breathing. 13, 13. The windpipe or trachea. 14. The lungs. 15. The heart. *a.* The stomach, pylorus, sometimes called milt. *c.* The left kidney. *d.* The broad ligament of the uterus or womb, with the ovary or organ of generation displayed. *e.* The last portion of the large intestine, the *rectum*. *f.* The orifice of the large intestine, the *anus*. *g, h, i, j, k, and l.* These letters show the internal muscles of the thigh.

## DISEASES OF THE HORSE.

**T**HE diseases of horses are very numerous, some of which can scarcely be distinguished from others, in their early stages, even by the most skilled veterinarian; it is therefore not advisable for an inexperienced person to attempt to prescribe in such cases, since a successful treatment of sick animals necessitates, not only a thorough knowledge of the whole animal system, but also the symptoms and nature of the disease, as well as the nature and action of the remedies. When a horse seems slightly ailing, it will frequently be found that good nursing, rest, and judicious feeding for a few days are all that will be necessary to restore him.

Nature effects cures more frequently in spite of powerful drugs, than with any assistance they may afford. There are, however, instances of acute disease where prompt attention will be necessary; and under such circumstances a good veterinarian, if procurable, should be sent for, but beware of ignorant "quacks" who administer powerful drugs of which they know little, into animals of which they know less, and which would either render recovery impossible, or cause a needless amount of suffering to the poor animal.

There may be cases of sickness or accidents where immediate action is necessary, which, if delayed a sufficiently long time to send for aid, might endanger the life of the animal.

Again, there are ailments of a trifling nature, requiring the most simple remedies, where it would be wholly unnecessary to secure the advice of a veterinarian, and which any person of good judgment could treat who was at all familiar with horses and their management. In any case, it is well for those having the care of horses to acquaint themselves with the nature of the more common diseases and their remedies.

We do not, however, approve the practice so frequently seen among horsemen of constantly dosing horses with all sorts of nostrums, torturing them with applications of every nature, both external and internal, which would be sufficient to make even a well animal sick.

Blistering should never be resorted to, except in cases of real necessity. Firing is a barbarous, cruel practice, and should become forever obsolete. Deep burning often results in inflammation and ulceration that may with difficulty be healed, and in the majority of cases more injury than benefit results from this mode of treatment. Blisters are only beneficial as a counter irritant, and are seldom necessary.

Good care and kind treatment, which comprise the observance of sanitary laws and humane considerations in all respects, will have a tendency to keep animals in a vigorous and healthy condition to the extent that but little if any medicine will ever be required. The majority of diseases to which horses are subject are due, either directly or indirectly, to a lack of ventilation in stables, as well as a lack of cleanliness in stable management, in other respects. Herbert very justly remarks:—

"It is not too much to say that more than one-half the ailments of horses arise, in the first instance, from bad management,—or, to speak more correctly, from absence of all management,—from an improper system of feeding, from ill-constructed, unventilated, filthy stabling, from injudicious driving, and neglect of cleaning. When disease has arisen, it is immediately aggravated and, perhaps, rendered ultimately fatal, either by want of medical aid, or, what is far more frequent as well as far more prejudicial, ignorant, improper, and often violent treatment, either on a wrong diagnosis of the affection, or on a still more wrong system of relieving it. Over-medicining and quacking slightly ailing horses is the bane of half the private stables in cities, and of nearly all the farm stables in the country; and one or the other, or both combined, cause the ruin of half the horses which "go to the bad" every year.

There is no quack on earth equal to an ignorant, opinionated groom; and every one,

now-a-days, holds himself a groom, who is trusted with the care of a horse, even if he do not know how to clean him properly, or to feed him so as not to interfere with his working hours. Every one of these wretched fellows, who has no more idea of a horse's structure or of his constitution than he has of the model of a ship or the economy of an empire, is sure to have a thousand infallible remedies for every possible disease, the names of which he does not know, nor their causes, origin, or operation; and which, if he did know their names, he is entirely incapable of distinguishing, one from the other. These remedies he applies at haphazard, wholly in the dark as to their effect on the system in general, or on the particular disease, and, of course, nine times out of ten he applies them wrongfully, and aggravates fifty-fold the injury he affects to be able to relieve.

These are the fellows who are constantly administering purgative balls, diuretic balls, cordial balls, on their own hook, without advice, orders, or possible reason—and such balls, too! some of them scarcely less fatal than a cannon ball—who are continually drugging their horses with nitre in their food, under an idea that it is cooling to the system and that it makes the coat sleek and silky; never suspecting that it is a violent diuretic; that its operation on the kidneys is irritating and exhausting in the extreme, and that the only way in which it cools the animal's system is that it reduces his strength, and acts as a serious drain on his constitution.

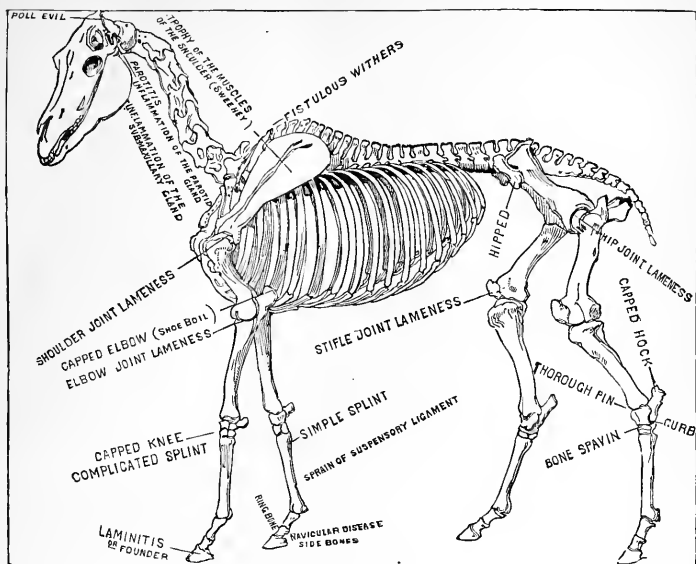
These, lastly, are the fellows who are constantly applying *hot oils*, fiery irritants, and stimulants, to wounds, strains, bruises, or contusions, which in themselves produce violent inflammation, and to which, requiring as they do the use of mild and soothing remedies, cold lotions, or warm fomentations, the application of these stimulating, volatile essences is much what it would be to administering brandy and cayenne to a man with a brain fever. It should therefore be a positive rule in every stable, whether for pleasure or farm purposes, that not a drachm of medicine is ever to be administered without the express orders of the master.

The more ordinary diseases and affections of the horse are very similar to those with which we are affected ourselves; their treatment is always analogous, often almost exactly identical; the processes by which relief is to be obtained are the same, and the medicines do not materially differ from those suitable to the human race. It is not too much to say that any intelligent man, gifted with good reasoning powers and not deficient in observation, who knows how to keep his own bodily health in a good state, and to deal with his own ordinary ailments, can, within twelve months, qualify himself to treat a horse in all the cases that are likely to befall him, under ordinary circumstances, as well as anybody else, and fifty times better than the stable-keepers, who will sneer at his efforts until they perceive that they are successful, and then will suddenly discover that the means he took are precisely those which themselves recommended.

The things of great importance which he has to learn, in order to guard against danger, are, how much depletion the system of a horse can endure without danger, and what extent of purgation his bowels can resist undamaged. And to these questions it may be answered, generally, that the horse can bear much more depletion and less purgation than is generally imagined, especially of the drastic drugs usually exhibited. We are very decided opponents of purgatives in general, and have been gratified by observing that the recent cause of veterinary practice, both in France and England, is tending to the entire abandonment of the old system; according to which, every horse, whether anything ailed him or not, was put through two annual courses of purgation, each of three doses, in the Spring and Fall, beside having to bolt a diuretic ball fortnightly, or oftener, according to the whim of the groom, when his kidneys no more required stimulation than his hocks did blistering."

Inasmuch as it is generally easier, by proper management and good care, to prevent diseases than to cure them after they have been contracted, the former will always prove the

better method in all respects. The following cut, copied from Kendall's Treatise on The Horse, shows the location of many of the common diseases of the bones and joints of this animal.



SKELETON OF THE HORSE.

**Anchylosis.** — This is a stiffening of the joints caused by the bone becoming united by bony material instead of the natural ligament. It is generally produced by extreme hard service, and especially in horses that are too young for hard work and before the bones and joints are sufficiently strong to endure the strain. The bones of the back and loins, as well as the limbs, are liable to become affected in this manner. When this difficulty exists to a considerable extent in the back, the horse will be stiff-backed, and consequently turns around, lies down and gets up with some difficulty. There is no cure for it.

**Blood Spavin.** — This is a somewhat soft swelling caused by an enlargement of the sack which contains the lubricating fluid of the hock joint, giving it a rounded appearance. Young horses and colts, especially if overdriven or worked hard, are more liable to have this form of spavin than older horses. It does not always cause lameness, unless the horse is worked sufficiently hard to aggravate the evil. It may, however, be justly regarded as unsoundness, and lessens very materially the value of the animal. Blood spavin is caused by bog spavin, and results when the distended sack of lubricating fluid, which produces the latter, becomes so enlarged that the vein which passes over it is compressed between this enlargement and the skin, to the extent that the blood is impeded. The accumulation of blood in the vein, in consequence, distends it, this distension generally reaching as far as the next valve, and we have what is called *blood spavin*. When once reduced, it is liable to occur again.

Entire rest for a time, together with frequent bathing of the affected parts with cold water, rubbing carefully with the hand, and bandaging, are generally the most successful

methods of treatment. In the use of the bandage, the compression should be upon the swelling. Compresses or spring trusses are very useful for this purpose. Blistering is frequently recommended, and more frequently practiced for this difficulty, but rarely results with any permanent benefit.

**Bloody Urine.** (SEE HÆMATURIA.)

**Bog Spavin.**—An enlargement generally in front of the hock joint, while in blood spavin the swelling is not only in front but extends to the inside and outside. Treatment the same as for blood spavin (which see).

**Bone Spavin.**—Bone spavin, or spavin proper, is an enlargement of the hock joints caused by a growth of bony matter which generally involves the heads of the splint and common bones, and the small bones with which they connect. Strains by hard labor will produce it, or anything that causes the weight and concussion to be thrown principally upon the inner splint bone and produce inflammation of the cartilaginous substance that unites it to the shank bone, thus inducing a bony deposit at this point. Raising the outer heel higher than the inner one in shoeing in order to prevent interfering, will sometimes cause spavin.

It generally makes its appearance upon the inside of the hock, and in front of the middle of the joint. There is always a lameness and considerable pain while spavin is forming, even in its earliest stages, and is most noticeable when a horse is first taken out of the stable. After being driven a short distance, the lameness will seem to subside, but will make its appearance again after standing a short time, and starting again. Sometimes horses are so lame from spavin that they are rendered entirely useless, while it is not infrequent that horses with large spavins are only slightly lame, or a little stiff in their gait. The pain and lameness is usually less severe after the bony process is completed.

Bone-spavin is the most serious kind of spavin with which a horse can be affected. If properly treated in the first stages, it is frequently cured, but no cure can be effected after a considerable amount of bony formation has taken place. When taken early, rest, with a little exercise,—such as that taken by a horse in being turned into a pasture,—together with the use of counter irritants on the part affected,—such as blistering,—will usually prove beneficial. Never resort to firing; it is a barbarous practice, and invariably results, not only with no benefit, but in a positive injury.

After a considerable growth of bony material has taken place, no treatment whatever will be able to cause an amount of absorption sufficient to produce a cure. The wisest course to pursue in the early stages of the disease, and the one recommended by some of the best veterinarians, is, to turn the animal out to grass, supplying him with cooling yet nutritious food, and that which is moderately loosening to the bowels. Constipation or other feverish tendencies should be avoided. During this time the joint affected may be bathed twice a day, for a week or more, with salt and vinegar, after which the blistering salve, or a substitute, may be applied to the spavin, care being used to judiciously regulate the application according to the effect it produces, avoiding over-irritation. Sometimes one application will be sufficient; in other cases it will need to be applied again in three or four days. After producing considerable irritation, the spavin may be permitted to heal until all the heat and inflammation have subsided, when the treatment may be again renewed. Avoid blistering too severely, as the difficulty may by this means be aggravated; an inflamed sore may be produced in this way that will be difficult to heal.

Another method of treatment in the first stages, is the application of cold water until the inflammation is reduced; this should be thoroughly applied the same as for any other inflammation, after reducing which an application to cause absorption of the bony material should be made as follows:—Mercurial ointment, four ounces; powdered cantharides, a half ounce; oil of rosemary, two drachms. Mix these well together, and apply to the spavin daily. The

cartilaginous substance that has not already changed to bone, can generally be absorbed by thoroughly rubbing the part with oleate of mercury daily for a few days.

Another preparation frequently employed by veterinarians in such cases is aqua ammonia, one ounce; olive oil, two ounces; mix these and add oil organum, two ounces; half an ounce of oil of wormwood; one ounce spirits of turpentine; camphor gum, one ounce; one pint of alcohol; mix thoroughly, and apply three times a day.

A blister for spavin—aside from that already given—may be made of one ounce of pulverized cantharides, mixed with three or four ounces of lard. In applying it, clip off the hair over the bunch, and rub in this mixture well for ten or fifteen minutes. One such application will generally be sufficient to produce the counter irritant required. After two days, apply sweet oil to soften and heal the skin.

As has previously been stated, a bone-spavin is a serious matter, and when once the bony material is formed to a considerable extent, or when ankylosis has taken place, no cure can be effected.

Although spavin is caused by strains and overwork, yet it is hereditary to a peculiar degree, the progeny of a spavined sire or dam being very liable to be affected in this manner at an early age. For this reason, such horses should never be used for breeding purposes.

**Bots.**—These are the larvæ of the bot-fly, which infests the stomach of the horse, and, sometimes, though rarely, produces injurious results. The horse bot-fly (*Gastrophilus equi*), a species of the gad-fly, lays its eggs on the hair of the horse, generally on the knees and sides of the animal. In licking himself, the eggs, or small worms that are hatched from them, adhere to the tongue, and are carried with the food into the stomach. The larvæ are provided with a hook, on either side of the mouth, by which means they attach themselves to the inner portion of the stomach, and there remain feeding upon the mucus for about a year. After attaining a considerable size, and undergoing certain changes, they release their hold, and, passing into the bowels, are eventually removed with the natural evacuations. This usually occurs late in the spring. The maggot buries itself in the ground, where it changes to a chrysalis, and, after a few weeks, escapes from its confinement a perfect fly. The female soon lays its eggs upon the parts of the horse which he is accustomed to lick, and in this manner the insect continues to be propagated. It is supposed that the bots, by their attachment to the coats of the stomach, do not produce pain, and that they cannot be removed by any medicine which will not injure the horse to have administered.

Their presence may be indicated by loss of flesh, and an unthrifty coat. The best treatment is to improve the condition of the animal by a generous supply of nutritious food, so that the system may not become debilitated, and the general health suffer. Tonics are sometimes administered, but, as a general rule in such cases, good care and generous feeding will obviate the evil without the use of drugs.

Sometimes the bot-worm is found in the rectum, and may be seen about the anus and under the tail, proving very troublesome to the animal. Injections of linseed oil, or tobacco smoke, will generally remove them. There is a disagreement among breeders and veterinarians as to the extent of the injury done by the bot-fly.

### Broken Wind. (SEE HEAVES.)

**Bruises or Contusions.**—Bathe in lukewarm water as soon as practicable, accompanied with rubbing by the hand, after which apply freely tincture of arnica two or three times a day. The sooner this treatment is received after the injury, the better.

**Burns.**—Linseed oil, or sweet oil, should be applied with bandages when the skin has been removed, and the parts be kept as much from the air as possible.

When the skin is unbroken and no blister formed, bathing in pure cider vinegar will be found an excellent remedy.

**Capped Ankles.**—This difficulty is generally produced by the same cause as capped hocks, and the treatment should be the same.

**Capped Elbow.**—(Shoe boil.) This is a tumor, formed just behind the shoulder, caused by the pressure against the calk or heel of the shoe while the horse is lying down. The best treatment is first to remove the cause by the changing or shortening the calks of the shoe, or by the use of pads in the stable that will protect this part of the body. If the tumor contains pus, it will be best to open it, and allow it to discharge, afterwards washing out the wound with castile soap and warm water, and allow it to heal.

If the tumor is hard, seems separate from the skin, and shows no signs of pus formation, it may be carefully removed with a sharp knife, and the location treated as a common wound. If callous simply, the washes or ointments recommended for spavin will prove beneficial, but it will require some time and repeated applications to remove the blemish.

**Capped Hock.**—The point of the hock is sometimes injured by the horse kicking in the stable, hard blows received in this locality, etc. It sometimes occurs from lying upon an unevenly paved stable with but little bedding. In such cases, there generally appears a soft, watery tumor, which is the enlargement of the mucus sack.

When the injury is not very severe, making cooling applications will sometimes prove beneficial, to be followed by the use of iodine ointment. Blistering will sometimes prove necessary, and quite beneficial, to be repeated after the skin is healed, if the first is not effectual. In extreme cases, where the tumor is large and does not yield to other treatment, a seaton is sometimes passed through it, and kept open until the discharge becomes somewhat of the nature of pus, after which wash with castile soap and warm water, and permit it to heal.

**Colic.**—This is a very common disease among horses, and frequently proves fatal. There are two forms of it, spasmodic and flatulent colic. The former, as its name indicates, is of a spasmodic nature, and sometimes terminates fatally in inflammation of the bowels.

*The causes of spasmodic colic* are the drinking of cold water when the animal is in a heated condition; sometimes exposure to cold winds or draft when heated; costiveness; unwholesome food; green food given in too large quantities when the animal is not accustomed to it or when he is heated will sometimes cause it; feeding with new corn will not unfrequently produce it; also an overcrowding of the stomach with food of any kind. Hard water will cause the colic in some horses. There also seems to be a predisposition to it in certain cases, and a horse that has once had it is quite liable to have it again. When recovering from the colic, a horse should be fed on warm bran mash, and be allowed to drink only water that is blood-warm, for two or three days, as cold water might bring it on again.

*Symptoms of spasmodic colic.*—Youatt thus describes the symptoms of spasmodic colic, also the method of distinguishing it from inflammation of the bowels, as follows:—

• The attack of colic is usually very sudden. There is often not the slightest warning. The horse begins to shift his posture, look round at his flanks, paw violently, strike his belly with his feet, lie down, roll, and that frequently on his back. In a few minutes the pain seems to cease, the horse shakes himself and begins to feed; but on a sudden the spasm returns more violently, every indication of pain is increased, he heaves at the flanks, breaks out in a profuse perspiration, and throws himself more violently about. In the space of an hour or two, either the spasms begin to relax and the remissions are longer in duration, or the torture is augmented at every paroxysm, the intervals of ease are fewer and less marked, and inflammation and death supervene.

## SYMPTOMS OF COLIC.

Sudden in its attack, and without any warning.  
 Pulse rarely much quickened in the early period of the disease, and during the intervals of ease, but evidently fuller.  
 Legs and ears of natural temperature.  
 Relief obtained from rubbing the belly.  
 Relief obtained from motion.  
 Intervals of rest and ease.  
 Strength scarcely affected.

## SYMPTOMS OF INFLAMMATION OF THE BOWELS.

Gradual in its approach, with previous indications of fever.  
 Pulse very much quickened, but small, and often scarcely to be felt.  
 Legs and ears cold.  
 Belly exceedingly painful, and tender to the touch.  
 Pain evidently increased by motion.  
 Constant pain.  
 Great and evident weakness."

As many of the symptoms of spasmodic colic are similar to those of inflammation of the bowels, such as pawing, kicking at the belly, looking round at the flanks, rolling violently, etc., it will be highly essential to distinguish between the two by the difference in symptoms as previously given, since the treatment for the former might prove very injurious, if not fatal, in the latter.

*Treatment for spasmodic colic.*—Having determined the symptoms to be those of spasmodic colic, and not inflammation of the bowels, the remedy should be resorted to as soon as possible, as delay is hazardous. Various remedies have been found beneficial in such cases, when promptly administered. One tablespoonful of chloroform mixed with a gill of whisky and a pint of warm water will often stop the pain almost immediately. This should be accompanied with an injection of warm soapsuds, using castile soap, or flax-seed water, made by turning boiling water on flax-seed, letting it stand until blood-warm, then strain out the seeds. A pint of linseed oil and a quart of warm water makes an excellent injection. If chloroform is not at hand, a pint of warm water in which as much salt as possible has been dissolved may be used as a substitute. This can be administered by a drenching horn or long-necked bottle.

Another remedy is one ounce of sulphuric ether, one ounce of laudanum, and a pint of raw linseed oil. At the same time an injection as above given will prove very beneficial in getting the bowels to act promptly. If this does not give relief in an hour the dose may be repeated. A very simple as well as excellent remedy, and one always at hand, is a tablespoonful of saleratus mixed with a pint of sweet milk and given at a single dose.

Some veterinarians use spirits of turpentine in cases of colic, but we consider it very objectionable, as having a tendency to irritate and inflame the throat and bowels, especially if there is any tendency to inflammation of the bowels, as is usually the case. As previously stated, clysters will greatly aid in exciting the bowels to action. Rubbing the bowels with the hand or a warm flannel cloth is also good. Occasionally walking the horse about (never trot or gallop him) will also serve the same purpose. Bleeding is sometimes resorted to when other remedies fail, but we believe that where good may be done once in a thousand cases, injury would result in the nine hundred and ninety-nine.

*Flatulent colic*, sometimes called "windy colic," is a very different form of disease from spasmodic colic, and is caused by an inflation of the bowels with gas produced by the fermentation of undigested food in the stomach or large intestines. This distention is sometimes so great as to cause strangulation or a rupture of the colon or caecum, producing instant death. The cause is usually overloading the stomach, or giving improper food in large quantities. The symptoms at first are similar to those of spasmodic colic, but after a time (generally from twelve to forty-eight hours), if not previously checked, the belly becomes considerably increased, being most prominent on the right flank.

*Treatment for flatulent colic.*—Relief will be effected by the getting rid of the gas that is inflating the bowels. For this purpose try first an injection, and if it results in the escape of

gas, good will have been accomplished. If the animal seems constipated, a dose of oil or aloes may bring relief. Walk the animal about, but do not permit him to exercise violently, such as rolling or trotting, as in severe cases of distention there would be danger of rupture. In severe cases, where delay might prove hazardous, and all other remedies fail, the trochar is sometimes used for the escape of the gas, the puncture being made in the middle of the right flank. No one should however resort to this remedy, unless skilled in its use.

**Corns.**—These are found in the angle of the hoof between the bars and quarters, near the heel, and are generally caused by improper shoeing, or the shoe being worn too long, which results in the hoof growing over the shoe, bringing the pressure of the weight upon the sole. Placing the shoe on in such a manner that the pressure comes upon the sole will also cause corns. An established corn is very troublesome, and will sometimes produce permanent lameness. Horses with low, weak heels and thin, flat soles are apt to have bruises of this kind. Old corns are difficult to cure, but those recently formed yield more readily to treatment, frequently disappearing with proper shoeing, that will remove the pressure from the part affected. A *bar* shoe that relieves the bar from pressure, and throws it upon the frog will often prove highly beneficial. This should not, however, be worn for more than two successive shoeings. The corn should be pared out very thin, and dressed every day with the following mixture: 1 drachm of chloride of zinc, 2 oz. of glycerine, and 6 oz. of water. Upon cutting away the horn over the corn, a red or dark purple spot will be found, the latter showing the corn to be a deep-seated one. After paring the part, it can be determined whether there is any matter or blood underneath; if there be any, a small opening should be made through the horn for its discharge.

When suppuration has taken place, a poultice should be applied until the corn is softened, after which the horny portion above it can be removed. The corn should then be kept dressed with a solution of one grain chloride of zinc to one ounce of water.

In all cases the most important part of the treatment is to remove the *cause* of the difficulty, by proper shoeing.

**Cough.**—A chronic cough in a horse is difficult to cure, and frequently leads to other troubles.

Steep half a pound of flax-seed in boiling water, and when nearly cold mix both seeds and tea with his food every day, for a week or so. Give him also a tablespoonful of the following once or twice each day: extract of belladonna 1 oz.; powdered muriate ammonia, 3 oz.; powdered liquorice, 5 oz.; powdered sal nitre, 2 oz.; honey, 1 lb.; Barbadoes tar, 1 lb.; powdered ginger,  $\frac{1}{2}$  oz. Mix thoroughly before using.

The best way to administer it, is to cover an old bit with a piece of cloth well fastened on, and smear it with a tablespoonful of the paste, before putting it in the mouth. The horse will suck it off in half an hour or so, after which remove the bit.

Another remedy, often very effectual: 1 oz. balsam of fir, dissolved in two ozs. sweet spirits of nitre, to which add 4 ozs. of the syrup of garlic; dose, a tablespoonful night and morning.

A simple, and sometimes very quick, remedy is found by steeping 2 parts liquorice root, 2 parts slippery elm bark, 4 parts flax-seed together, and giving two or three times a day.

**Crib-Biting.**—This is a vice that is sometimes acquired by a colt when teething, or by horses that are too highly fed, and but little used. It not unfrequently happens that horses that are not sufficiently fed will form the habit, from not having their hunger appeased. Sometimes it seems to be from mere idleness, and not having anything else to do the horse bites his manger.

When once the habit is well established, it is a difficult one to cure, and an inveterate cribber may be looked upon as a hard case.

Horses will also form the habit by imitation, from seeing others. A young horse may sometimes be cured by turning him out in a pasture for several weeks, and not permit him to occupy a stall during that time. By this means the habit will be frequently forgotten. A strap buckled rather tightly round the neck, and thus compressing the wind-pipe, is also pretty sure to check the evil, and frequently to cure it; but it is an objectionable one, as it must be constantly worn to prove effectual, and its pressure is apt to bring on a greater evil, which is an irritation of the wind-pipe, and which leads to roaring.

Muzzles and certain patent halters have also been used to some extent; also covering the wood work with sheet-iron, etc.

The best remedy that we have ever known, is to mix cayenne pepper and brown soap together, forming a paste, and apply it in numerous places within reach of the horse, and especially to those parts of the manger or wood-work wherever the marks of his teeth are discerned. It should be lightly applied, and the place disguised by having a little dust sifted over it, so that he will not be able to distinguish its locality. He will soon evidently entertain the opinion that the whole wood-work tastes the same, and let it entirely alone.

A five-ring halter with a piece of sheet-iron or zinc cut in the shape of a heart, and so attached to the halter that when the neck is arched in the act of cribbing, the point of the piece will prick the skin under the lower jaw, will frequently cure the habit.

Always keep a little rock salt within their reach, where they can get it when they wish.

**Curb.**—This is one of the numerous diseases of the hock, and consists of an enlargement of the back of it, three or four inches below the point, and results from a strain to either the ligament which binds the tendons or of the sheath of the tendons. Any sudden action of the animal that brings a strain upon this part, such as leaping, severe galloping over uneven ground, or a violent check while galloping, will be liable to produce it. Pulling a horse up suddenly on his haunches while going rapidly at any gait will also not unfrequently cause it.

It will usually produce lameness and may justly be considered unsoundness, although some horses will have curbs for years without being lame. It may be best detected by a side view of the leg.

The inflammation should first be reduced by frequently bathing the part in cold water, or in vinegar, in which a little salt has been dissolved. A wet bandage is good if it can be made to fit the leg, but it is difficult to keep a bandage on without obstructing the movement of the joint.

It is very essential that an animal thus strained should be allowed perfect rest for a time. Arnica is also valuable for relieving the soreness. Cold water in which saltpeter has been dissolved, applied sufficiently to keep the leg constantly wet for a few days, is used very successfully by some veterinarians.

In cases of long-standing blistering may be necessary, and the same treatment given as for ring-bone.

**Diabetes.**—This disease is rare in the horse, and when once fully established is regarded as incurable. It may, however, be cured in its early stages, by removing the cause, which is generally the use of strong diuretics or unwholesome food, that has a tendency to induce an increased action of the kidneys. The hay and oats should be of the very best quality. Mow burnt hay has a tendency to produce this disease. The administering of powerful nostrums, which act upon the kidneys, as is frequently done by many ignorant persons having the care of horses, (and usually without the knowledge of the owner,) will sometimes prove the secret of this difficulty. In the first place, in this disease, the most careful attention should be given respecting the quality of the food.

Carrots and other green food, such as potatoes, are very good, given with oats and bran. Flax-seed steeped in water for several hours, should be liberally given. In connection with this, give one drachm of iodine of iron, and from ten to twelve grains of opium once a day. A moderate dose of opium administered twice a day is also an excellent remedy in some cases.

Bleeding for this disease, according to the old time method of practice, is one of the worst things that could be done, and should never be permitted under any circumstances.

**Diarrhea.**—Flax-seed gruel mixed with the food is very soothing to the bowels in cases of diarrhea or dysentery. In connection with this give 1 oz. prepared chalk, 12 grains pulverized opium; tincture of aconite root, from fifteen to twenty drops. Mix in a little water and give in one dose. If relief does not follow in three or four hours after administering the above, repeat the dose. Feed with good hay and oats, giving a warm bran mash (wheat) every other day; also every day a half pound of flax-seed that has been steeped in hot water several hours.

Another very good remedy, where the disease assumes a chronic form, is to give one of the following balls every day, until three are used; afterwards two the next week, and one the week following: Barbadoes aloes 16 dr.; nitrate of potash 18 dr.; sulphate of iron 2 oz.; powdered gentian 2 oz.; powdered capsicum 3 dr., and Venice turpentine sufficient to make into six balls.

**Distemper.**—This is a kind of contagious disease among horses, characterized by a swelling between the bones of the lower jaw, and which generally terminates in an abscess. Horses that have it should be kept apart from all others. Feed warm bran mash and green food principally; keeping the animal warm and comfortable, while at the same time, the stable should be well ventilated, also kept clean and free from offensive odors.

In some cases it may be necessary to poultice the abscess until it breaks, or is ready to be opened. After the abscess has discharged, the appetite will return. The animal will then require a generous amount of nutritious food to recover its former condition and strength. Rest and good nursing are better than medicine in such cases.

**Epizootic.**—This disease has been known also under the names of contagious influenza, epidemic catarrh, contagious catarrhal fever, etc. It is estimated that from the time of its first appearance, which was in Canada in September, 1872, and during the winter of 1873, the epizootic influenza destroyed 1,500 horses and mules in New York city, or about 4 per cent. of the entire number it contained. The immediate cause of this disease is, without doubt, blood poisoning from germs floating in the air, and it generally proves most malignant and contagious in large, overcrowded and ill-ventilated stables.

The early symptoms of this disease are a general weakness, hanging of the head; shivering of the body and trembling of the limbs; watery discharge from the nose, and sometimes a watery appearance of the eyes; loss of appetite; staring hair; weak, quick pulse and rapid breathing. A horse thus affected seems reluctant to lie down, and stands in an unnatural, strained manner, his legs seeming to prop up his body. The bowels are generally somewhat constipated, and the urine much less in quantity than in health. The discharge from the nose becomes of a white, yellow, or greenish hue, and is quite copious. In some cases the throat becomes very sore and ulcerated, the swelling showing externally, the animal refusing to eat.

It is always best in the first place, since prevention is much easier than cure, to avoid, as far as possible, all diseases of this nature by allowing the animals an abundant supply of pure air, and the observance of other sanitary conditions, which can only be secured through proper ventilation and cleanliness of the stables. The following methods of treatment are condensed from that recommended by Dr. James Law, of Cornell University.

In the treatment of this disease everything that has a debilitating or depressing tendency should be carefully avoided, such as bleeding, purging, unduly stimulating the kidneys, violent blistering, depressing sedatives, etc. In the regular and uncomplicated form of this disease, nearly all suffering with it will recover without the use of medicine under good nursing, and with an abundant supply of pure, fresh air. The animal should be placed in a cool, dry box that is well ventilated, and provided with a good, clean litter, clothing him comfortably in order to avoid all tendency to a chill, and bandaging his legs loosely. The skin should be carefully brushed or curried, the clothes changed two or three times a day, and the animal kept quiet and still, except perhaps giving him a little exercise in the shelter and sunshine. Feed with bran mash,es, boiled oats or barley, turnips, carrots, or other roots in small quantities and often, so as not to cloy the appetite. For drink, a quart or two of water nearly cold, or cold oatmeal or flax-seed gruel, should be frequently given. The action of the kidneys and bowels should be moderate, but never excessive. It will be better to obviate a tendency to costiveness by frequent injections of water that is blood-warm, — three or four quarts at a time, — or by a half pint of molasses, or three ounces of sulphate of soda added to the same quantity of water.

If necessary to give a laxative, it should be done with care, the dose rarely exceeding one-third the usual quantity, as violent purging would be very hazardous. Mild febrifuge diuretics may be used to advantage, such as spirits of nitrous ether in half-ounce doses given twice a day, or liquor of acetate of ammonia in ounce doses four times a day, in the water-gruel drank. When the cough proves especially violent and painful, a drachm each of anodynes, such as belladonna and camphor, may be added to the above diuretics with advantage.

The cough may be further relieved by causing the animal to inhale warm water vapor several times a day for an hour, which is most conveniently done by saturating chaff bran, or other simple agent, with boiling water and placing it in a nose-bag, which is hung on the animal's nose by means of a strap crossing behind the ears. Counter-irritants often prove beneficial. If, however, inflamed and sore throat seem extreme, a poultice may be applied with advantage a day previous to blistering, or the throat may be well fomented with warm water for an hour, and then wrapped in a sheep-skin with the wool turned inward. Oil of turpentine, which has been largely used as a counter-irritant in many cases, is objectionable on the ground of causing so much local irritation without blistering, as to drive some excitable horses almost to distraction.

The throat and chest where the disease has been located may often be greatly benefited by producing an irritation by rubbing in a thin pulp of ground mustard and water, and then covering up. This may be replaced by a soap liniment, composed of six ounces of soap, three of camphor, and a pint each of proof spirit, liquor ammonia, and linseed oil, to be applied frequently at short intervals, and be well rubbed in. If a more active blister is wanted, an ointment may be used composed of a drachm and a half of powdered cantharides, a scruple of camphor, ten drops of spirits of wine, and an ounce of lard. The hair should be cut off and the blister rubbed in, in a direction contrary to that of the hair. After it has acted, the skin should be kept soft and pliant by rubbing it with fresh lard.

Any of these irritants should be applied to a limited space only, and not exceeding the bounds of the inflammatory action, as the best results are thus secured. For this reason a careful examination of the chest especially, should always be made before making such an application. As the mouth becomes cooler and more moist, and the pulse softer and less frequent, a more stimulating treatment is desired. At first, two drachms each of gentian, powdered cinchona, niter and sal ammoniac may be given night and morning, or if the debility is very great, the last-named agent may be replaced by four drachms of carbonate ammonia made into a bolus with linseed-meal, or dissolved in a half pint of water and repeated three or four times a day.

In cases marked by a daily remission, a dose of thirty grains of sulphate of quinia may prove effectual in preventing the paroxysm, if given an hour or two before the period when it was in the habit of appearing. During convalescence, gentian, cinchona, and other tonics are desirable, with alcoholic, ammoniacal, or other stimulants, if there is much debility or prostration. The diet should be tempting and nutritious, supplied often, fresh and frequently varied, care being taken at all times to counteract any sudden suppression of the bowels and kidneys, or even the nasal passages.

**Farcy.**—Farcy and glanders are regarded as but different types or stages of the same disease; there is, however, a great difference in their symptoms and progress. They both are caused by blood poisoning, and are generally due to bad stable management, the neglect of proper sanitary conditions, etc. They are liable to be found in poorly-ventilated stables, where many horses are crowded together. Absorption of the virus from glandered or farcied horses is also another cause of farcy, as it is very contagious. This disease is generally characterized by a rough, unhealthy-looking coat, the swelling of one limb, sometimes the swelling of the head, especially the muzzle, loss of flesh and strength accompanied with eruptions on different parts of the body, etc., which break and discharge; in fact, it would be almost impossible to describe, in a limited space, the many forms that this disease assumes in different stages, and in different cases.

Farcy differs from glanders in being much more slow in its progress than the latter, and in involving the lymphatic system, while glanders attacks the nasal mucus membrane. Both are regarded incurable, although in a mild form of farcy, nutritious and generous diet, green food, and remedies that may be employed, will prove beneficial to a certain extent. Carrots are excellent to form a part of the diet in such cases.

Farcy is very contagious to man as well as horses, and those having charge of animals thus affected cannot be too cautious with regard to becoming infected with it. For this reason, many of the best veterinarians recommend, when it is ascertained for a certainty that a horse has this disease, that he be killed at once, and the body deeply buried, that no animal may be contaminated by it. From five to ten grains of hydriodate of potash given daily in connection with three drachms of sulphate of iron and two drachms of gentian, have been found beneficial, at the same time using an external application to the swollen parts, of equal portions of mercurial ointment and lard, well rubbed in.

Another method of treatment is as follows:—A tablespoonful of sulphite of soda once a day for a week, to be followed by a tonic to improve the general condition of the animal, consisting of pulv. copperas  $\frac{1}{4}$  lb., pulv. gentian  $\frac{1}{4}$  lb., pulv. fenugreek  $\frac{1}{2}$  lb., pulv. elecampane  $\frac{1}{4}$  lb. Mix thoroughly and give a tablespoonful once a day. Everything used about the diseased animal, whether in clothing, grooming, or feeding, should be kept from all healthy animals, while it is of course equally essential that the animal himself should be kept apart from others. This disease is very deceptive, and it frequently happens that when the symptoms are most favorable, the ulcers healed, and the swelling disappeared, that it will break out again and prove fatal in a short time. (SEE GLANDERS.)

**Fistula.**—In horses, a fistula is most liable to occur upon the withers or top of the head; in the latter case it is called by farriers poll-evil. It is a deep, chronic abscess which discharges pus through fistulous pipes to the surface. They are generally caused by blows, galls, or strains, and are usually formed from wounds of long standing, neglected sores, etc., and are most frequently found in old, overworked, and poorly-kept horses.

In old cases, where the bone is involved, cure will be impossible, and the animal had better be humanely killed, and put out of misery. If the bone has not been reached by the abscess, the pipe leading from it should be cut open carefully with a sharp knife, the direction of the pipe being determined by a probe, and the wound washed thoroughly with

warm water. Wash two or three times a day with the following mixture: chloride of zinc, 1 dr.; carbolic acid, 3 dr.; water, one pint. Sometimes a thorough application of hot caustic solutions is essential before using the wash, in order to make the flesh heal.

**Founder** (*Laminitis*).—This is an inflammation of the laminæ of the horse's foot, and may be caused by overdriving, exposure to cold when perspiring, thus suddenly checking perspiration, overfeeding, or giving food and cold water in large quantities too soon after excessive work; long continued driving on hard pavements or frozen ground, improper shoeing, driving through a deep stream or river when warm, etc.

This disease has two forms—the *acute* and *chronic*; the former may be cured, if properly treated, and taken in season, but the latter is considered incurable, although it may be considerably relieved. This disease resembles rheumatism in many respects, and, like that, the acute form is attended with fever and pain. The fore-feet are generally affected, and sometimes the muscles of the chest.

A foundered horse will be known by his peculiarly mincing gait, as though it hurt him to put his fore-feet upon the ground; by a hot, contracted hoof; by resting his fore-foot upon the toe, and also by keeping his fore-feet stretched out as far as possible, so that the weight of the body will rest on the heel, instead of the toe.

*Treatment of Acute Founder.*—Perfect rest is essential. Give the horse a large stall, and a good deep bedding of clean straw. He may thus be induced to lie down, which will relieve the pain of the feet by removing the weight from them, and aid in producing a cure. Where the inflammation is very great, it may be necessary to sling the horse up so that his hoofs will not touch the floor.

The shoes should also be removed. Some veterinarians apply warm poultices to the hoofs, but we prefer cloths wet in ice water, applied frequently, to be continued for several hours, and occasionally for two or three days, if necessary. This reduces the inflammation and pain. From fifteen to twenty drops of tincture of aconite should be given in about half a pint of cold water every four hours, until six doses have been given. Give mash, grass, carrots, or potatoes, with oats, for a few days; also all the water, and as often as the animal will drink. When recovering, and well enough to exercise some, turn the horse out to grass to remain until the cure is completed.

It is also a good plan to let the horse stand in about six inches of sawdust, wet a little once or twice a day, for two or three weeks, when recovering from acute founder, or in chronic founder. This gives a soft floor to stand upon, and keeps the hoofs moist and soft.

*Treatment for Chronic Founder.*—Nothing can be done for this form of the disease, except to relieve it somewhat. The entire hoof should be frequently wet; also kept well oiled with castor or linseed oil. The oiling should extend up to the skin, and cover the sole. A soft floor, such as earth, sawdust, or tan-bark, occasionally wet, should be provided in the stable. A protection of sole-leather, or similar substance, sometimes proves highly beneficial by being put on over the sole before setting the shoe, allowing it to come to the edge of the wall of the hoof, so that the nails may be driven through it in fastening on the shoe. A filling of cotton, saturated with tar and oil, should be put in between the leather and the sole.

**Fracture.**—In surgery, fractures are distinguished, according to their nature, by the terms *simple*, *compound*, *complicated*, *comminuted*, etc. A *simple* fracture is when the bone only is divided, and there is no wound to admit air to the seat of the fracture. By *compound* fracture is meant that there is such a wound. A *complicated* fracture is one in which some other serious injury is inflicted near it, such as the rupture of the osseous tissues, important nerve trunk, or blood vessel, by the broken bone, or when the fracture extends into the cavity of the joint.

A *comminuted* fracture is where the bone is broken or crushed into several small pieces. In cases of simple fracture a horse may (with proper treatment) so far recover from the injury as to be made useful for many purposes, and when such an accident happens to a valuable animal, it will pay to take the trouble to accomplish it. In the other forms of fracture mentioned, it will generally be useless to attempt a cure, and the animal had better be killed at once, and relieved of his suffering.

The treatment of a fracture should be such that the portions of the bones broken shall be restored to their original position, and held there by some means that will keep them secure in place until they have united, and at the same time will not cause discomfort or injury to the patient.

A friend of the writer had a valuable pet horse that had its leg broken above the knee, by accidentally falling off a steep declivity while running in the pasture. Although many advised killing the animal, the owner, being greatly attached to him, did not follow the advice, but had the limb properly placed and bandaged, and the horse taken to a large spreading apple tree in the orchard,—it being summer,—and slung up to one of the strong branches, just enough to relieve the limbs of the weight of the body.

A hollow was then made in the ground directly under the broken leg, to prevent the possibility of its hitting anything. An awning tent was constructed about him, so as to keep off the storm, and at the same time to be open on all sides in pleasant weather. This animal recovered to the extent that he has been used for a carriage-horse for several years, there being no indication of the former injury except that the broken limb is not quite as strong as the others, but even this is only detected when he has become very tired from an unusually long journey.

In setting a fractured limb, the bones should be placed in their former position so that when grown together the limb will be of the same length as the corresponding one, and also to secure the most strength possible. The broken surfaces should be brought closely together. It is a good plan to apply a coating of tar to the leg a few inches above and below the fracture; then wrap the whole leg in cotton-batting, just enough to keep the splints from hurting the skin, and place over this, splints cut from wood, that will rest evenly upon the leg. There should be four or five splints placed about the leg in such a manner as to keep the bones in place. All uneven spaces under them should be filled with cotton. Over these, carefully wrap strong bandages several times around, and secure them by pins or soft cord, so that they shall not become loosened. The bandages will require being sufficiently tight to hold all securely in place, and at the same time should not be so tight as to prevent a proper circulation of blood in the limb. The splints should be carefully examined every day to see that they have not become displaced.

A little tincture of *arnica* poured over the fracture will relieve the soreness, and it may be well to give the animal from twenty to twenty-five drops of tincture of aconite root every five or six hours during the first twenty-four, to lessen the fever and pain somewhat. The horse should have plenty of nutritious food, and all the water he will drink, if given frequently. Green food, such as fresh grass, carrots, turnips, or potatoes, should be given in connection with oats. A bran mash should also be given occasionally.

When a horse thus injured is kept in a stable, it will be well to make a hole in the floor underneath the foot of the broken leg, to avoid its touching anything, and admit of its hanging in a natural position. It is considered unnecessary by some to sling the horse up to relieve the limb in case of fracture, but we regard it as a sure precaution against any displacement of the bones, which would be liable to occur if this were not done. In slinging the animal, he should not be entirely elevated from the ground, but to the extent that he may be able to relieve himself, and rest from standing. The broken limb should always have the earth hollowed out under it, or some other means employed to permit it to hang free from all obstructions and obviate hitting against anything.

**Galls**, which in farriery means sores produced by the friction of the saddle, or any part of the harness, are best remedied by removing the *cause* and see that every part of the harness and saddle fit properly, and there is no uneven pressure, since it is better to prevent such evils than to cure them. Apply twice a day some of the following mixture: Laudanum, two ounces; tannin, two drachms. When partially healed, pulverized charred leather and lard, well mixed and applied, will aid in the healing process, and also prevent the hair from growing out white.

Washing the galled places with a solution of sugar of lead, or dressing with equal parts of mutton-tallow and beeswax, melted together, are also good remedies. In all cases, there should be allowed no pressure upon the part until it is perfectly healed.

Where there is a liability of an abscess forming, such as where lumps are formed or the skin callous, take out the stuffing from the collar directly over where the injury lies; this will relieve the pressure at that point. In all cases of galls there should be no friction on the part, during the healing process, by the wearing of the collar or harness. Give nature a chance to repair the injury and she will generally do it unaided.

An old stage-driver of long experience that we used to know, and who was noted for keeping his teams sound, always washed the shoulders and breasts of his horses as soon as the harness was taken off, using cold water in the summer and lukewarm water in the winter. After rubbing nearly dry, he washed them daily with a decoction of smartweed (*Polygonum hydropiper*) in the summer, when there was most danger of galled shoulders.

In the winter he used the smartweed only about once a week, and his horses never had sore necks or shoulders, though in constant and hard usage upon the road.

**Glanders.**—This is the worst disease with which a horse may be afflicted, and a glandered horse is a dangerous animal to have about, since the contagion is very easily communicated both to man and animals. There are instances of those having died of it who have had charge of horses with this disease. It is, therefore, the safer and better way to kill a glandered horse at once. The cause of this disease is lack of cleanliness, poor ventilation in stables, catarrhal diseases, reduced and weakened condition of the system, lung fever, and any disease that may generate pus, and which by being absorbed by the system poisons the blood.

The first stage of this disease is characterized by a dark hue of the nostrils, accompanied by a discharge of thin, transparent fluid. This may possibly continue for months. The discharge eventually becomes thicker, of a gluey consistency, and the lining membrane of the nostrils has sores upon it. This ulceration of the nose will generally extend into the throat. The coat will be rough and unhealthy-looking, and frequently the animal becomes hide-bound. The legs also swell, and the body wastes away in flesh. If the discharge from the nostril of a glandered horse should come in contact with a wound or a mucous surface, such, for instance, as the lining of the nostril, it will produce a similar disease. The danger attending the persons having the care of such horses is so great, and the disease so very contagious to other animals that, as previously stated, no cure should be attempted, and a well-directed bullet through the brain will prove the best remedy in such cases.

**Grease (Scratches).**—This is an inflammation of the skin of the heels of the horse. It sometimes is found in the fore-feet, but more frequently in the hind ones. Swelled legs will sometimes degenerate into this disease. Grease is caused mainly by bad stable management; permitting the mud and dirt to dry and remain in the heels, cutting away the hair that gives a natural protection to the heels; wet and filthy stables; standing in the cold when the heels are wet; or washing them and permitting them to dry off by evaporation. Untrimmed horses are less liable to have them than those from whose legs and heels the hair has been closely cut. Some horses seem to have a constitutional tendency to this disease. There is

generally a white, greasy discharge from the heels of the horse, accompanied with a hot and tender swollen skin, which cracks open and sometimes sloughs off, leaving a sore that is difficult to heal.

*Treatment.*—Wash the parts with Castile soap and warm water, then rinse with clear warm water and wipe dry. Apply at once a solution of 30 grs. of chloride of zinc and one pint of water. After about ten minutes apply a liberal quantity of glycerine to the parts. If the case is very obstinate and does not yield to this treatment, increase the quantity of zinc to 40 or 45 grs., and apply as before. Feed the animal liberally, giving part green food.

Another remedy that has proved very effectual in some cases is to wash the parts as before, and wet them three times a day with the following mixture: Sulphate of copper, 2 oz.; hot water, 1 pint; carbolic acid,  $\frac{1}{2}$  oz. After a few days of the above treatment, apply the following twice or three times a day: Tincture of aloes comp., 4 oz.; glycerine, 3 oz.; tannic acid, 2 dr.; tincture of opium, 2 oz.

Grease takes many different types, and requires treatment accordingly. In cases that do not yield to local treatment, it may be well to give some simple alterative, such as 2 dr. of pure cream of tartar, 2 dr. of powdered saltpetre, and 4 dr. of flowers of sulphur. Such a dose may be mixed with the food every evening during the week, and continue every other week as long as may be necessary. At the same time some one of the above-mentioned remedies for treatment of the heels should be adopted, or the following: Wash the heels as previously recommended, and apply twice or three times a day this mixture: 2 oz. of crude carbolic acid, 2 oz. of glycerine, and 15 oz. of raw linseed oil.

### Gripes. (See Colic.)

**Heaves.**—This disease greatly lessens the value and usefulness of a horse, and is due to the rupture or enlargement of the air-cells of the lungs. It is either preceded or accompanied by a cough, which is quite characteristic, being very short and followed by wheezing. When driven quickly for a short time, a horse with this disease breathes with difficulty, the inspirations being very short and rapid. This disease is hereditary, and no animal having it should ever be used for breeding purposes. Narrow-chested horses are more liable to it than those with broad, deep chests, since the latter admit of more room for the expansion of the lungs in breathing. Horses that devour large quantities of coarse food, are worked hard with their stomachs distended with it, and are greedy feeders, are very liable to have the heaves.

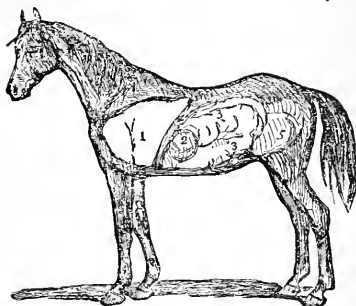
This disease cannot be cured, since it is impossible for any medical skill to repair the ruptured or enlarged cells of the lungs, but considerable may be done to palliate the evil. Attention to the quality of the food is of great importance. Instead of large quantities of food being given that require much room, such as coarse hay, etc., that which is nutritious and requires but small compass should be fed, such as a liberal supply of oats and a small amount of hay. Chaff is considered objectionable, as it is rapidly eaten, and thus distends the stomach too much. Carrots, potatoes, and other green food are useful in such cases. It is a good plan to wet the oats and also the little hay that is given. A half pound of flax-seed on which a gallon of boiling water has been turned and permitted to stand over night is also good to give frequently, mixing both the tea and seeds with the food. Bran mash is excellent. The following, given in tablespoonful-doses daily, is good: Powdered licorice, 3 oz.; powdered nitrate of potash, 4 oz.; Barbadoes tar, 1 lb.; mix thoroughly.

**Hematuria (Bloody Urine).**—The cause of this cannot always be determined, but it generally proceeds from some great strain or a severe blow. Sometimes pure blood is discharged, at other times it is more or less mixed with the urine. Perfect rest and cooling food are the very best remedies.

**Hide-Bound.**—This usually arises from a deficiency in the quality or quantity of food, and also frequently occurs in lingering diseases that emaciate and weaken the body. In this disease the skin adheres to the body. Nutritious food in liberal quantities and variety should be given. Wheat-bran and corn meal made into a warm mash is excellent. Cut hay, oats, carrots, potatoes, and other green food should also be fed.

**Influenza.** (See *Erizootic*.)

**Inflammation of the Bladder.**—Inflammation is sometimes located in the body of the bladder, and, again, only in the neck of it. The symptoms are quite similar to those of inflammation of the kidneys. The causes are generally the presence of some irritating matter in the urine, or stone in the bladder. If there is considerable fever, give one scruple of aconite every two hours. Where there is much pain, the same quantity of belladonna may be given. If the evacuations of the bladder are obstructed, the careful use of the catheter should be employed. Difficulty in urinating is sometimes due to a foul sheath, and can frequently be relieved by cleansing the same properly with warm water and a sponge, and giving small doses of nitre.



The above cut shows the location of some of the internal organs of the horse. Fig. 1, the lungs; 2, the stomach; 3, the colon; 4, the diaphragm; 5, the bladder.

**Inflammation of the Bowels.**—This disease is one which frequently terminates fatally. The causes are various, and may be exposure to the cold, drinking cold water in large quantities when warm, overdriving, diarrhea, constipation, and sometimes it follows violent attacks of colic. The symptoms are very severe, and continuous pain in the bowels. It varies from colic in this respect, the latter being intermittent with intervals of rest. The general difference in the symptoms between this disease and the latter have already been given under *Colic* (which see).

When constipation seems to be the cause, a quart of raw linseed oil should be given. It would also be well to give injections of warm flax-seed tea, or thin gruel, from which the seeds have been carefully strained. These can scarcely be too copious, for the sooner the bowels can be made to act without irritating them, the better. If the disease proceeds from diarrhea, or over-purging, give an ounce of the tincture of opium, and twenty-five drops of the tincture of aconite in a half pint of water. Give for drink, flax-seed gruel. If the cause is other than those mentioned, give from twenty-five to thirty drops every three hours, also injections of thin flax-seed gruel, or warm water, (the first-mentioned is best,) until the bowels move. The belly should have blankets wrung out in hot water applied, and renewed as often as every fifteen or twenty minutes, rubbing on first over the belly with the hands carefully ground mustard made into a thin paste with vinegar. This will act very quickly as a counter-irritant, and will have a tendency to relieve the internal inflammation.

Some veterinarians recommend bleeding, and there is quite a diversity of opinions respecting it in this disease; we are inclined to the belief that in the large majority of cases bleeding would be objectionable. Clysters of gruel should be continued for two or three days in some cases, in order to keep the bowels open and free.

The limbs should be rubbed with the hands to promote circulation, also bandaged to be kept warm. The body should be kept warm, though not uncomfortably so, but the air of the stable should be cool and pure. Avoid drafts of air in securing good ventilation. Bran mashes and flax-seed steeped in hot water, together with green food should be given.

Oats and hay should not be allowed during the attack, but may be given gradually, a little at a time, as the horse gets better. Anything that would have a tendency to irritate the bowels should be carefully avoided.

**Inflammation of the Kidneys.**—This is by no means a rare disease in horses, and it is also one which is usually treated more unskillfully than almost any other. Some of its causes are the improper use of nitre or other diuretics, poor food, over-work, exposure to cold after being heated, or under the saddle a long time, being out in a cold storm with the rain dripping upon the loins; also a strain in the loins.

The symptoms are short, quick breathing, accompanied with fever, quick pulse, disinclination in the animal to walk or move the hind legs, but when he does so, keeps them unnaturally wide apart. The urine will also be scanty and dark-colored, frequently bloody. A pressure with the hand upon the loins over the kidneys will prove tenderness and soreness in this locality, by the manner of the animal.

Clothe the horse warmly, and avoid drafts of cold air. Apply a paste of ground mustard wet with vinegar to the loins, by rubbing it into the hair with the fingers; afterwards keep clothes wet in hot water upon the loins; or a sheep-skin with the skin side inward may be kept there, to induce perspiration in that locality, a fresh one being applied after a few hours, as the first becomes wet.

Give all the flax-seed tea the animal will drink, and keep the bowels open by injections of the same, or warm water. About twenty grains of powdered opium may be given two or three times at intervals of two or three hours during the first stages. If there is much fever, twenty drops of tincture of aconite may also be given with benefit, to be repeated a few times at intervals of four hours, until the fever abates. Rest for four or five weeks, and careful usage for some time will be necessary, as this disease is slow in recovery, and will be liable to return unless some such precaution is taken. Always allow plenty of cool drink to the animal with this disease.

**Inflammation of the Lungs (Lung Fever—Pneumonia).**—This disease is usually caused by taking a sudden cold, such as may be contracted by the horse on being taken from an ill-ventilated, warm stable, and driven against a cold, sharp wind, or in a snow or cold rain storm; a change from a warm stable to a colder one; standing exposed to a draft of air in the stable; exposure to cold after being heated by hard work or driving; turning the horse out to pasture early in the spring before the weather has become sufficiently warm, working the animal when he is not in proper condition, or putting too much hard work upon one that has not been accustomed to it.

The *first* symptom and the *surest* in this disease is a chill, the animal almost invariably being taken with an attack of shivering, and seems to be cold all over. This soon passes off and is succeeded by a general warmth of the body, or more commonly by a fever heat, and cold legs and ears. The pulse will be quick and wiry, and the breathing difficult. A peculiar crepitating sound will be heard from the lungs, if the ear is applied to the chest or neck. The horse has a generally dejected air, drops his head, and does not seem inclined to lie down, or change his position.

The animal should be kept warmly clothed, and the legs bandaged, but the stable should be supplied with pure fresh air by the most perfect system of ventilation, which will be an abundance of pure air without exposing the animal to a draft.

Keep the bowels open by giving part green food, such as carrots, turnips, and potatoes, if the animal will eat,—feeding little at a time and often; if not, and there is any costiveness, a moderate dose of raw linseed oil may be given (not castor oil). Give plenty of water, or, what is better, flax-seed tea. Rub a mustard paste, made of ground mustard and vinegar, on the sides and chest, in the locality directly over the lungs (which can be determined by the

previous small cut, showing position of the internal organs),—and give from twenty-five to thirty drops of tincture of aconite root in a half pint of cold water until five or six doses have been given, at intervals of four or five hours.

Hay tea, oat meal gruel, warm bran mash, and raw eggs may be given with benefit in severe cases. Coarse food, such as hay, should not be allowed until the animal is somewhat relieved.

Keep the animal loose in a large box stall, with plenty of clean bedding. He should be kept quiet and undisturbed. When he lies down (unless it be from very weakness), it may be regarded as a favorable symptom. Do not make him get up after he has lain down; rest will do him more good than medicine.

Great care will need to be used in feeding as he gets better, in order not to overload the stomach, but to give a sufficient amount of nutritious food to strengthen and build up the animal. It should be in small quantities and often, for some time. This is a slow disease, and its effects are very exhausting and lingering, and there is a liability of its recurrence unless great caution is taken against taking cold. Chest protectors for horses that are driven in cold, windy, or stormy weather would be of much utility in preventing this disease.

### **Laminitis.** (See FOUNDER.)

**Lice.**—The skin of the horse is extremely sensitive, and if for any reason it becomes infested with lice, the irritation and annoyance will be enough to almost distract a nervous animal.

Horses that have been sick with a lingering disease, and are in a run-down condition, or that have a skin disease, will sometimes be troubled in this way. Or if the stall be near where fowls are kept, this may be the cause of the difficulty. Anoint the skin with linseed oil, sweet oil, or melted fresh lard, and after an hour or two wash off with castile soap and water, taking a portion of the body at a time, afterward rinsing with clear water, and wiping dry.

### **Lockjaw.** (See TETANUS.)

### **Lung Fever.** (See INFLAMMATION OF THE LUNGS.)

**Mange (Itch).**—This disease usually makes its first appearance on the neck at the root of the mane, and unless treated in season will be liable to extend upward to the head, or down to the withers and back, sometimes extending over the whole body. It is an eruption which causes intense itching, and after the breaking of the watery vesicles the hair falls off, leaving a bare spot covered with scurf. It is a very contagious disease, and is originally caused by neglect of cleanliness, and lack of nutritious food. Cattle and horses with this disease will communicate it to each other by the least contact. The disease is produced by a very small insect which burrows in the skin, causing the irritation and destroying the hair follicles. The most simple, and one of the best methods of treatment, is to wash off the scurf from the skin with castile soap and lukewarm water, and if there are any scabs formed, soak and break them up so that the ointment applied may reach the insect readily. Wipe dry and rub thoroughly into the skin an ointment of equal quantities of sulphur and lard, well mixed.

It may sometimes be necessary to give in the same connection two or three ounces of sulphur mixed with the food. The ointment should be repeated once a day until a complete cure is effected, being washed off with castile soap and lukewarm water after it has been on five or six hours. It is a good plan to let the animal be in the warm sun for a time after it has been applied.

Carbolic acid washes, a decoction of tobacco, and other remedies are frequently used with good effect, but the sulphur ointment is to be preferred.

**Megrims.**—This disease is a mild form of apoplexy, and is a pressure of blood upon the brain, caused by an unusual flow of blood to that organ. Various causes contribute to this disease, such as excessive exercise in a hot day, violent blows upon the head, tight collar or check-rein, the two latter of which would prevent the blood from circulating freely, and from returning from the head, which would unduly distend the blood-vessels of the brain. Youatt describes the symptoms as follows:—

“When the horse is driven rather quickly, he will, without any premonitory symptoms, suddenly stop, shake his head, and exhibit evident giddiness, and half-unconsciousness. This will soon pass over, and he will go on as if nothing had happened.

When the attack is more serious, he will fall without the slightest warning, or suddenly run round once or twice, and then fall. He will lie insensible, or struggle with the utmost violence. In five or ten minutes he will begin gradually to come to himself; he will get up and proceed on his journey, yet somewhat dull, and evidently affected and exhausted by what had happened, although not seriously or permanently ill.

A predisposition to a second attack almost always remains, and it is a long time before the blood-vessels recover their former tone. Experience has shown that a horse that has had a *second* attack of the megrims is never to be trusted.”

The treatment should be modified according to the cause of the difficulty. Bleeding at the moment of attack should be resorted to, in severe cases. If the animal is constipated, a moderate dose of physic should be administered. Rest and careful nursing for a while, together with judicious feeding, will be better for the animal than drugs, in the majority of cases. A covering worn over the head, but not resting upon it, will prove very beneficial in protecting the brain from the hot sun. These are supported by a wire and fastened to the head-stall, and are much used on draft-horses in many localities.

**Navicular Disease.**—This is sometimes called “foot disease,” and is an inflammation of a small bone in the interior of the foot, called the navicular bone. Improper shoeing, and overwork on rough roads and hard pavements, are the principal causes. It may be best determined by an unnatural degree of heat in the foot, although the symptoms are somewhat obscure. Remove the shoe and soak the hoof, in water that is quite warm, from half to three-quarters of an hour every day. In some cases it may be necessary to poultice the foot to further relieve the pain and inflammation. The horse should have a long period of rest, extending from two to six months. It is a disease that is slow of recovery, while if there be a relapse, a cure may be regarded as very doubtful. It is highly important that it receive attention in the first stages. A blister applied around the coronet will frequently prove highly beneficial, while in severe cases a frog-seaton should also be inserted, and a discharge encouraged by a daily dressing of it with the tincture of cantharides. In about three or four weeks the seaton may be removed, and another blister applied. The horse should then be turned out to pasture and permitted to run for three or four months. Particular care should be taken to have the horse shod properly after recovery.

Hygienic management in the stable is also very important in such cases. Some prefer a cold bath for the foot instead of warm, but we have always found the latter most beneficial.

**Ophthalmia.**—This is an inflammation of the eye, which is liable to recur at regular intervals, and frequently terminates in total blindness to one, or both eyes. It is sometimes called “moon blindness.” The attacks are usually rather sudden; the lid becomes swollen, and water drips from the corner of the eye. The eye is very sensitive, and there is an aversion to the light. This disease frequently terminates in a cataract. Pure air and cleanliness in the stables are of the first importance, and any carelessness in this respect will increase the difficulty.

Treatment should commence during the first stages. Sometimes a seaton put in about

an inch below the corner of the eye, will result in a cure. Thread a sharp darning-needle with hair from the mane, then pinch up a little skin a full inch directly below the corner of the eye, and push the needle through, drawing the hair in, and tying a knot in each end to prevent the hair getting out. Leave it there eight or ten days, turning it a little each day. It may be necessary to grind the point of the needle to make it sufficiently sharp, and the hair should be left long enough at each end to take hold of readily. The food should be laxative, and the stable moderately dark, the head to be so placed that the light, either direct or reflected, shall not fall upon the face. Keep wet sponges on the eyes, and frequently bathe the lids with the following lotion:—Tincture of opium,  $\frac{1}{2}$  oz.; tincture of belladonna, 3 dr.; powdered acetate of lead, 1 dr.; rose water, 2 oz.; soft water, 12 oz.

**Occult Spavin.**—This is quite similar to bone spavin, except there is in it no perceptible enlargement, the location of the disease being within the joint. Because there is no enlargement of the joint exteriorly, this difficulty is often mistaken for hip lameness. It should be treated the same as BONE SPAVIN (which see).

**Overreaching.**—This frequently results from improper shoeing, and may be remedied by removing the cause. It consists in striking the heel of the fore-feet with the toe of the hind shoe, which sometimes makes a bad wound. It may be prevented by rounding off the inside edge or rim of the hind shoes. When a bruise has been inflicted by overreaching, apply tincture of arnica liberally as soon as practicable.

**Pink Eye.**—This is a common term used to denote a form of influenza in which the eyes become bloodshot and swollen, accompanied by a watery discharge more or less abundant. It takes its name from the color of the mucous membrane of the eyelid, which is pink, bright red, or a very dark red, according to the degree of congestion of its blood vessels. Sometimes this inflamed condition of the eye is followed by the formation of pus, and the swelling of the limbs. It is also frequently accompanied by symptoms of lung fever, bronchitis, or an inflamed condition of the bowels, according to the type and severity of the disease, as well as the symptoms of influenza.

Rest and good nursing will do more for the animal than medicine. Care should be taken to observe the best sanitary conditions in stable management, and prevent the animal from taking cold. Judicious feeding is essential, while plenty of drink should be given. Small doses of saltpetre are very beneficial. Avoid a strong light in the stable. Bandaging the limbs to keep them warm, and blanketing according to the temperature of the external air, are of great advantage. The treatment should vary according to the type of the disease, as recommended in epizootic or influenza.

**Poll Evil.**—This is a fistulous ulcer that sometimes makes its appearance at the top of the head or just behind the ears of the horse. It may be caused by a violent blow, hitting or rubbing this part against anything with sufficient force to produce inflammation, or pulling against a tight halter. Straining the ligaments of the muscles by high checking or sudden tight reining will sometimes cause it.

The skin becomes hot, tender, and swollen, and a tumor frequently forms. The horse should not have a halter pressing upon the locality, but go loose in a shed or large box-stall. In the early stages, the inflammation should be reduced by keeping a sponge or cloth wet in cold water constantly on the parts, or a mixture of equal parts of strong vinegar and water with tincture of arnica added in the proportion of a quart each of the former, to two ounces of the latter. When the inflammation has been reduced, and there is hardness, indicating a tendency to tumor formation, apply daily an ointment of one drachm of iodine mixed thoroughly with one ounce of lard. If the tumor suppurates, it will be best to open it, which should be done when the pus becomes near enough the skin to be felt by the finger slightly soft beneath. The opening should be lengthwise with the neck.

When the pus has been discharged cleanse the wound and its surroundings with a sponge and warm water, and afterwards wash two or three times a day with a solution of sixteen grains of chloride of zinc to a pint of soft water. If it does not heal readily under this treatment it may sometimes be necessary to insert a seton, as in cases of fistulas of long standing.

**Pneumonia.** (See INFLAMMATION OF THE LUNGS.)

**Quarter-Crack.** (See SAND-CRACK.)

**Ringbone.**—This disease is so called because it constitutes a bony growth around the pastern bone. It frequently spreads quite rapidly, and not only involves the pastern bones, but the cartilages of the foot. It is generally found among heavy draft horses and such as are overworked on hard roads and pavements, although, like bone spavin, a tendency to this disease may be hereditary, and occasionally a young colt will be found with this bony enlargement. The treatment should be similar to that for bone spavin (which see).

**Roaring.**—This is an unnatural sound made by some horses when drawing the air into their lungs, especially while traveling fast, and results from some obstruction of the trachea or windpipe. It is due to various causes, the principal of which is the continued use of a tight check-rein, which keeps the head of the animal in an unnatural position, compressing the larynx until it becomes permanently distorted, and does not permit a free passage of air into the lungs. A tight throat-latch will also produce the same result. Chronic cough and catarrhal colds sometimes terminate in roaring. When this disease is once established it is difficult to cure. The best treatment that we can recommend is to remove the cause as far as possible by discontinuing the use of the check, and permit the throat-latch to be worn as loose as practicable. This disease may be regarded as hereditary.

**Sand-Crack.**—This is a separation of the laminae of the hoof, forming a crack up and down its wall. When it occurs in the front part of the hoof it is called a "toe-crack," and when on one side, "quarter-crack." It usually begins at the coronet, the thin edge parting and extends until it often divides the entire hoof. It more frequently occurs in the inner quarters than elsewhere, and is often caused by improper shoeing. It also indicates brittleness of the hoof, which is due to a certain extent to its quality, also to diseases in this locality, the frequent wetting and drying of the feet, dry, hot weather, impaired nutrition, overwork, low condition of the animal, and impure state of the blood.

This difficulty should receive attention in its early stages, and the animal given entire freedom from work. Nutritious food should also be given in liberal quantities, and the best sanitary conditions observed in stable management. We believe in interfering as little as possible with a sand-crack, except to keep it free from sand and dirt. There should be no cutting, firing, or rasping, as sometimes recommended. An application of the solution of three grains of chloride of zinc to an ounce of water twice a day, together with daily washing with Castile soap and warm water, will prove very beneficial. Castor or linseed oil applied to the external surface of the hoof will also counteract the brittle tendency of the hoof in a great measure. (See BRITTLE HOOF, on a previous page.)

If the animal is to be used, the crack should be filled with lint saturated with the solution previously recommended, which should be kept in place with a piece of cloth covered with tar, which will keep out the gravel and other foreign substances. This should be removed and the crack washed out at night. If the crack extends through the crust so as to cause lameness, it will require considerable time to complete a cure, and such are serious cases. The more a horse is used that has a cracked hoof, the more danger is there of increasing the difficulty. It is a good plan to turn a horse out to pasture,—if it occurs in summer,—and permit him to remain there until completely cured. In severe cases it may be necessary to apply a blister to the coronet, just above the crack.

M. Defay, a French veterinarian, has discovered a preparation which he recommends for sand-cracks or fractured hoofs, and which he claims forms a hard and durable cement. The precaution necessary for its successful application, is to carefully remove all traces of grease in the crack and about the edges, with spirits of sal ammoniac, sulphide of carbon, or ether. As we have never tested its merits, we are not able to express an opinion as to its utility for this purpose. The recipe for the cement is as follows:—Take one part of coarsely-powdered gum ammoniacum, and two parts of gutta-percha, in pieces the size of a hazelnut. Put them in a tin lined vessel, over a slow fire, and stir constantly until thoroughly mixed. Before the thick, resinous mass gets thoroughly cold, mould it into sticks like sealing-wax. The cement will keep for years, and, when required for use, it is only necessary to cut off a sufficient quantity, and remelt it immediately before application.

**Scratches.** (See GREASE.)

**Sore Shoulder.** (See GALLS.)

**Spavin.** (See BONE SPAVIN.)

**Splent or Splint.**—This is a bony growth, generally located upon the inside of the fore-leg of the horse, a little below the knee-joint. It is usually caused by overworking a young horse. The treatment recommended is the same as that for BONE SPAVIN (which see).

**Staggers.** (See MEGRIMS.)

**Strangles.** (See DISTEMPER.)

**Strains or Sprains.**—The wrenching or torsion of the muscles or tendons will generally be succeeded by pain, lameness, and swelling. Stonehenge thus defines strains of this nature:—“Muscular strains consist of an absolute tearing of the fibrous tissue composing the muscles; or else of such an approach to a disruption as to have an equally prejudicial effect in producing lameness. In some cases the whole of a small bundle of fibers is torn across; but this is not the usual degree in which strains occur, and the most common amount of mischief is only a slight separation of a few of the very small fibers of which the bundle is composed; and this state is then generally spread over a considerable surface, producing considerable soreness from inflammation. Tendinous and ligamentous strains are very similar in their nature, and consist either in an absolute tearing apart of these fibers, or such an approach to this as to cause great inflammation, and consequent incapacity for using them. Sometimes what is supposed to be a strain of the tendon is really an inflammation in its sheath, which causes great swelling and pain, and the limb is thereby rendered quite useless for the time being.”

Bathing the parts in tincture of arnica is one of the best remedies for injuries of this nature. Where the skin is not broken, hot fomentations of vinegar and water applied with flannel bandages, and renewed every ten or fifteen minutes until the inflammation is reduced, is an excellent remedy, and considered by many the best possible treatment. Where there is much acute inflammation and swelling, linseed or carrot poultices will prove beneficial. The bandages should also be kept tight in such cases.

**Stringhalt.**—This is an involuntary action or contraction of the muscles which causes one or both of the hind-legs to be raised higher in walking than is natural. It may be regarded as unsoundness, and greatly injures the appearance of the animal, but does not much interfere with his service. It is incurable.

**Tetanus (Lockjaw).**—This is one of the most painful and fatal diseases to which a horse is subject. It generally proves fatal, and when recovery does take place it is usually very slow, and extends over several months. The disease derives its name from the fact

that the muscles of the jaw are so affected that the mouth become immovably closed. It usually results from some injury to the foot, such as the stepping on a nail and driving it into the sensitive portion, or from a prick in shoeing. It not unfrequently follows castration, the docking and nicking of the tail, or other injuries. A sudden exposure to cold after being heated has also been known to produce it.

Tetanus is a disease of the nerves, caused by an injury to one of them, the effect of which extends to the entire nerve organization. When it terminates fatally, it is generally from the sixth to the eighth day after receiving the injury. The animal should be kept as quiet as possible, and nothing of an exciting nature permitted.

The difficulty with the treatment of this disease is, that it usually becomes well established before it is discovered, when remedies will have less effect than at an earlier period. It would always be well to take suitable precautions against it whenever the hoof is injured by being punctured by a nail or other substance. We once lost a beautiful and valuable animal with this disease, from stepping on a nail while on the road. As soon as the accident occurred, the horse stopped, held up her injured foot, and looked back to us.

We immediately got out of the carriage, and, on examining the foot, found the nail, which, on being withdrawn, did not indicate by any blood following, or the length of the nail, that the puncture was a deep one, but she died of lockjaw from the effect five days afterward, after the most intense suffering.

When an injury of this kind occurs it would be well to take precautionary measures by removing the shoe and soaking the foot and limb in warm water for an hour or more, as soon as possible afterward, at the same time rubbing it gently with the hand. Then apply tincture of arnica from the knee down, rubbing it in, and getting as much as possible into the hole made by the nail.

A hot poultice for the foot and limb would also prove beneficial. Such treatment followed immediately after receiving the injury, would have a tendency to ward off the disease. The bowels should be kept moderately laxative, and a plenty of water and flaxseed gruel given for drink.

When it is discovered that the animal has the disease, the shoe should be removed, and the foot carefully examined to see if there is any nail or foreign substance in it; if such are found, pull them out, and treat as above recommended. Give the following dose: One ounce of powdered aloes, half a drachm of podophyllin, and two drachms each of nitre and ginger. Make into two balls with mucilage, and give both at the same time. Injections of flaxseed tea or warm water will aid also in keeping the bowels open. If there should be any difficulty in evacuating the bladder, the catheter should be used for this purpose. Opium is also a valuable agent in this disease, and may be given in doses of from one to two drachms.

The animal should be tempted to eat nutritious food by putting it occasionally to his mouth, or between his grinders. Carrots or apples are excellent; also warm bran mash. Rub the body gently, especially along the neck and spine. Keep him warm by blanketing, and induce perspiration.

In the middle of the day, if the weather is warm and pleasant, and not uncomfortably hot, let him be out in the sunshine a while. Keep up the natural functions of the animal system, and, above all, keep him soothed and quiet. Have no strangers about him, or loud talking, or noise of any kind; neither permit him to be harnessed, but keep him as quiet as possible.

**Thoroughpin.**—This is a disease similar to bog spavin, and projects on both sides of the hock, from one side of the joint to the other, forming a round swelling. The treatment should be similar to that of Bog Spavin (which see).

**Thrush.**—This disease consists of inflammation of the lower surface of the inner or sensible frog, attended by a discharge of pus. It is caused by foul stables and neglect of the feet.

The remedy is to remove the cause, by giving proper attention to cleanliness. The feet should be washed with castile soap and warm water at morning and night, carefully removing the loose and decayed portions of the frog; dry the parts thoroughly, after which apply the following mixture between the crevices of the frog: Barbadoes tar, eight ounces; melted lard, one ounce; sulphuric acid, half an ounce. Cover with tow and a leather sole and keep from stepping in the wet.

Another remedy equally good is to cleanse the foot as above indicated, then dust in a little of the following: Calomel, two drachms; powdered sulphate of copper, three drachms; carbolic acid ten drops. Cover with tow, etc., as in previously given remedy. When the liquid discharge has ceased, fill the cleft with tar, and continue to apply this if necessary, for a week or two.

**Toe-Crack.** (See SAND-CRACK.)

**Tread.** (See OVER-REACHING.)

**Warts.**—Where the warts are very small, they may be cut off close to the skin with a pair of scissors, and the place touched with lunar caustic. If the stem is large, tie a thread of waxed silk around quite tight, gradually tightening it each day. This method deprives it of its nutriment from the skin, and it will drop off in a few days. It is said that an application of indigo dissolved to the consistency of thick paint, and applied daily to warts will remove them without soreness. Having never tried the latter we cannot vouch for its correctness.

**Windgalls.**—These are soft swellings or enlargements near the fetlocks of horses, produced by strains or overdriving. Tight bandages, and astringent lotions may be applied with benefit. A piece of cork placed over the swelling, and covered with bandages sufficient to keep it down, is sometimes used. They are similar to blood spavin, and should be treated accordingly. (See BLOOD SPAVIN.)

**Worms.**—Salt seems to be obnoxious to worms; therefore have a good piece of rock salt in the manger at all times, or a sufficient amount of common salt, within reach of the animal. Common purgatives will often bring away large numbers. The following is a good remedy: Tartaremetic, 2 dr.; ginger, 1 scruple; 1 pint linseed oil; half pint molasses. Give half an hour, every other morning, before feeding-time. Also, flaxseed tea every day. Another good remedy is spirits of turpentine and quassia tea; first beating the turpentine with the yolks of eggs, to cause it to mix readily. To a pound of quassia chips, add three quarts of boiling water. When cold, strain off the tea, (which is a sufficient dose for an adult horse) and add the turpentine; giving in proportionate quantities as follows: For a colt six months old, a half ounce of spirits of turpentine; a year old, one ounce; two years, 1½ ounces; three years, 2 ounces; four years, three ounces. Give every other day, in the morning before feeding. Feed with nutritious food—a mixture of green food being very beneficial. Raw potatoes are excellent for horses troubled with worms. An injection of a quart of linseed oil will prove the best remedy for removing the smaller worms (*ascaris*), which often cause such serious irritation and annoyance about the anus.

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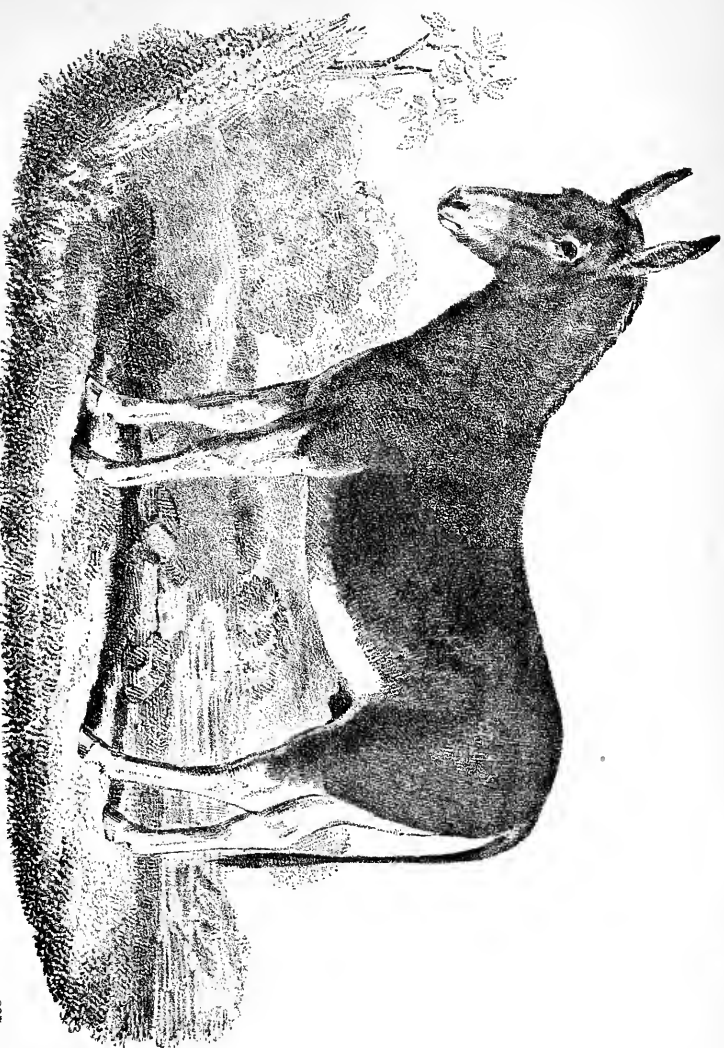
## THE ASS.

THE ass is a native of Central Asia and Africa and belongs to the genus *Asinus* and family *Equidæ*. It is of smaller size than the horse, and is characterized by long ears, the absence of warts on the hind legs, and a tuft of long hair at the extremity of the tail. Its color is generally gray, marked with a dorsal streak of a darker hue, and a similar one across the shoulders. There are also white and black varieties, though less common than the former. This animal was probably domesticated by man before the domestication of the horse, and has proved a most valuable servant, possessing, as it does, great strength, endurance, patience, and docility. The first mention of the ass in the Scriptures is in the account of the going of Abraham into Egypt, at the time of the great famine in Palestine.

A wild variety of the ass is now found in Abyssinia, and some other localities, and although differing somewhat from the domestic variety, it resembles it in many respects. It has cross-bands on its legs, a mark occasionally seen in the domestic breeds. There seems to be a natural aversion in this animal to cross the smallest stream of water, a trait which is also seen in the camel, while it delights to roll itself in the dust and sand, which fact would argue in favor of the desert regions as its original home. The wild ass is a spirited animal of great speed, and is one of the principal objects of chase in Persia, where its flesh is highly esteemed as food. In Oriental countries they are employed as beasts of burden, and the practice of riding them in traveling is very common. Careful selection and more humane treatment than this animal usually receives, shows that it is capable of great improvement, and possesses qualities that have never been fully appreciated. In Southern Europe, especially in Spain, Italy, and Malta, it has been carefully bred and greatly improved.

**Varieties, etc.**—The different breeds of the ass are supposed to be quite as numerous as those of the horse. The Maltese and Spanish breeds are considered by American breeders the best variety from which to propagate. The small size of the ass in cold countries is due fully as much to neglect, as to the severity of the climate. It is said that in the north of India, where it is used among the lowest castes, it does not attain a height greater than that of the Newfoundland dog. In Persia there are two breeds, one large, heavy, and slow, used principally for burden, and another, considerably smaller and more active, used for the saddle. In Spain there is still a greater difference seen. The Arabs and Persians breed them as carefully as we do our best horses, and are perfectly familiar with their pedigree. Darwin states that in Syria there are four distinct breeds:—"A light and graceful animal with agreeable gait, used by ladies, an Arab breed, reserved exclusively for the saddle, a stouter animal, used for plowing and various purposes, and the large Damascus breed, with peculiarly long body and ears."

The ass is but little used in the United States except for breeding purposes in producing mules. They are bred to a certain extent throughout the Western and Southern States, but principally in Kentucky, Tennessee, Texas, Ohio, Indiana, Illinois, and Missouri. In Kentucky, where mules are in great demand, and where they are raised with much care from imported animals of an average height of fourteen hands, they have been raised to fifteen and even sixteen hands in height. Jennets, or female asses, are used principally in this country for breeding jacks, and are not numerous. A superior Maltese jack was presented to General Washington, in 1787, by La Fayette, and is believed by some to have been the first of this breed ever sent to this country. The description given of him by Mr. Custis is that of a moderate-sized animal, clean limbed, very active and spirited, and possessing the ferocity of a tiger; color dark brown and nearly black, white belly and muzzle, and manageable with safety only by one grown. This animal lived to a great age, and his progeny was highly prized.



**"MAGNUM BONUM." Copied from an old Painting.**

A Gray Jack-Ass once owned by Hon. Henry Clay of Ashland Ky. This animal was fourteen hands high when four years old. He was sired in 1834 by Maltese Jack Achilles, imported by Henry Clay, his dam being a descendant of the stock owned and bred by Gen. George Washington.



It is believed that Gen. George Washington was the pioneer in the business of mule-breeding in this country. It seems that previous to 1783 there were very few mules in the country; and these were such inferior animals that farmers were very much prejudiced against them; consequently there were few jacks, and no disposition to increase the stock. Washington, however, became convinced that the introduction of mules generally among Southern planters would prove a great blessing to them, because these animals are longer lived, less liable to disease or injury by careless help, are well suited to a hot climate, and will work on shorter feed than horses. A recent writer says, respecting this subject:—

“It becoming known that the illustrious Washington desired to stock his Mt. Vernon estate with mules, the king of Spain, in 1787, sent him a jack and two jennets from the royal stables, and La Fayette sent another jack and jennet from the Island of Malta. The first was of a gray color, sixteen hands high, and of a sluggish nature. He was named the Royal Gift. The other was called the Knight of Malta; he was about as high as the former, and lithe and fiery, even to ferocity. The two sets of animals gave him the most favorable opportunity of making improvements by cross-breeding, the result of which was the favorite jack Compound, because he partook of the best points in both originals. The General bred his brood mares to these jacks, even taking those from his family coach for that purpose, and produced such superb mules that the country was all agog to breed some of the same sort, and they soon became quite common. This was the origin of improved mules in the United States.”

The teeth of the ass are similar to those of the horse, and the age of the animal is indicated, as in the horse, by the changes that occur at different periods during their growth.

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## THE MULE.

**A**S will be seen from the foregoing, the improved mules of our country owe their origin to the intelligent, and therefore successful management of Gen. Washington, a man who could be “first in war, first in peace, first in the hearts of his countrymen,” and, when he saw the necessity, also the first in breeding mules for his countrymen to use. As is well known, a mule is a hybrid, the produce of a jackass and a mare, while a hinny is the produce of a female ass and a horse, and is therefore half-horse and half-ass, the same as a mule; but there is a wide difference between them. The hinny has the voice, the mane, and the tail, and very much of the form of the horse; while in all of these particulars the mule resembles the ass more strongly than the dam.

The mule is an exceedingly hardy animal, and admirably adapted to hard work in hot weather, such as would be too severe for either the ox or horse; for this reason it is peculiarly valuable in the Southern States, for farm use, and all kinds of heavy work. Mules are also used quite extensively in the Western States, but only to a limited extent in New England. North of 40° they are used much less than south of this latitude, while beyond 43° they are rarely employed. There has recently been an increasing demand for mules for exportation to Europe, which has given a new impetus to the trade. St. Louis is the principal mule market in the United States, although they are raised in various sections. Kentucky, Tennessee, Ohio, Indiana, Illinois, Missouri, and Texas, as previously stated, being the States in which they are bred in the greatest numbers.

**Economy of Mule-Labor.**—Being longer-lived and more hardy than the horse, the working period of the mule is considerably longer, while it will thrive with less care. A well-bred mule, with proper care, will out-wear two horses. Mules do not become frightened

as easily as horses, and when frightened are not as liable to run away. A good mule-team costs much less than a proportionately good horse-team, while a mule is raised to a working age much more cheaply than a horse.

Mules may be kept at less expense than horses, and are not subject to as many diseases, while those they may have are more easily cured. On the other view of the subject, a horse may be used for pleasure driving, or for all purposes, while a mule is suited only for heavy work, and purposes of draft. Judge Hinckley, of Northampton, Mass., formerly a breeder of mules, always kept a team of them for performing the drudgery of farm work, much preferring them, after an experience of fifty years, to horses for this purpose, although he kept his stables full of horses besides. One pair thirty years old were particularly serviceable, having outlived several generations of horses, and though the latter were often out of condition and sick, the mules never were. One of his stock, forty-five years old, was perfectly able to perform his share of labor.

Another gentleman who used mules for over thirty years, says:—"From repeated experiments I have found that three mules from fourteen and a half to sixteen hands high, capable of performing any work a horse is usually put to, and which were kept constantly at work, consumed about the same quantity of hay, and only one-half the provender which was given to two middling sized coach horses, only moderately worked. I am satisfied that a large-sized mule will not consume more than three-fifths to two-thirds the food to keep him in good order, that will be necessary for a horse performing the same labor. The expense of shoeing a mule the year round, does not exceed one-third that of the horse, his hoofs being harder, more horny, and so slow in their growth, that shoes require no removal, and hold on till worn out; and the wear, from the lightness of the animal, is much less.

Mules have been lost by feeding on *cut* straw, and *corn meal*; in no other instance have I known disease in them, except by inflammation of the intestines, caused by the grossest exposure to cold and wet, and excessive drinking cold water, after severe labor, and while in a high state of perspiration. It is not improbable that a farmer may work the same team of mules for twenty years without having a farrier's bill presented to him. In my experience of thirty years, I have never found but one mule inclined to be vicious, and he might have been easily subdued while young. I have always found them truer pullers, and quicker travelers, with a load, than horses. Their vision and hearing are much more accurate. I have used them in my family carriage, in a gig, and under the saddle, and have never known one to start or run from any object or noise, a fault in the horse that continually causes the maiming and death of numerous human beings.

The mule is more steady in his draught and less likely to waste his strength than the horse, hence more suitable to work with oxen, and as he walks faster, will habituate them to a faster gait. In plowing among crops, his feet being small and following each other so much more in a line, he seldom treads down the ridges or crops. The facility of instructing him to obey *implicitly* the voice of the driver is astonishing. The best plowing of tillage land that we ever saw, we have had performed by two mules *tandem*, without lines or driver."

Mules have been driven eighty miles in a day without injury, although this is not to be recommended, and it is too much to expect of any animal, yet it shows how much they are capable of enduring. Mr. Ellicott, of Patuxent Furnaces, states that out of one hundred mules in the works, they have not lost, on an average, one in two years, while he does not recollect that they have ever had one that was wind-broken. They are rarely defective in the hoof, and though kept shod, shoeing is not as necessary as with horses. Their skin is tougher than that of a horse, and they are consequently not as much annoyed by the flies, and do not suffer so much with the heat in summer. Mr. Morris, of Pennsylvania, says:—

"Being a dealer in this class of live-stock, and coming in almost daily contact with their muleships, I have learned their dispositions and habits pretty thoroughly, and having learned

their full worth on the farm, have entirely discarded horses for farm-work, knowing from actual experience, that mules make a far more economical farm team than do horses."

Although mules will thrive on coarser and considerably less fare than horses, yet it is always the most economical and pays best to give either horses or mules, or in fact any kind of stock, a plenty of good food without overfeeding them. We believe the mule should be fed with as good food as horses, and that they require as much in proportion to their size.

**Breeding Mules.**—The breeding of mules in America began with much spirit in the New England States, soon after the Revolutionary war. They were then bred as an article of commerce, being at first shipped exclusively to the West Indies, but afterwards to the South and West, for use in the sugar-mills, and other plantation work. At first the breeding animals were very inferior, both sires and dams, the stock produced being held in derision where they were bred, but in those days anything blessed with long ears, and called a mule, commanded a remunerative price and ready sale. As a natural consequence, a prejudice was established against the whole mule family, which has to this period never been entirely removed in certain localities.

The improved mule, an American production and superior animal, has been largely introduced in the West, and to some extent all over the country, besides being imported to Europe quite extensively. The size of the mule most profitable to raise for use in the West and South is from fourteen and a half to fifteen and a half or sixteen hands in height, since, other conditions being equal, size is the measure of strength. It is found in mule-breeding that the jack should be a spirited animal, and not less than fifteen hands high, and that the best mules result from crossing such with improved blooded mares. The noted jacks, Mammoth and Warrior, which have so improved the stock of this country, were imported to Kentucky from Spain about the year 1837, at a cost of \$5,000 each. These animals were sixteen hands high, of fine quality, and greatly improved the size of the jack stock by their crossing with the common jennets of the State. They were the result of crossing the jacks of Malta with jennets of Spain.

In breeding mules, it is highly important that the jack be of the height previously mentioned, in order that the progeny be of good size; also that they be intelligent, active, and spirited animals, that these other good qualities be also perpetuated. It is likewise of equal importance that the best mares be used,—blooded mares,—and, as a general rule, the finer the mare the better the mule product, unless too small.

Mr. E. F. Spencer of Kentucky, a gentleman of large and successful experience in mule-breeding, gives the result of his observation and experience in this department as follows:—

"During the breeding season, beginning here in March, the jack should have a lot sufficiently large to supply him with grass at night; but in the day he should be kept in a tight stable. The lot should be located, if possible, where no horse stock can come to the fence; for if they do, a vigorous jack will fret through the night and may become vicious, and sometimes will bite horses through the fence.

They frequently fret from this cause till they get poor in flesh and unserviceable. If permitted to run in the lot during the day, you may feed him, three times a day, four to six ears of good sound corn, and two bundles of sheaf oats, cut up to the band. I have found by experience this to be the better plan. If the breeder has no grass lot, he should feed corn and oats, the latter cut fine enough to make chop feed. This is a feed composed of oats cut up and corn-meal ground fine—fine enough for family purposes. Put a little salt, if not every time it is fed, at least frequently; and don't feed too much at first, to avoid founder—or the new meal may cause colic.

A jack should be permitted to serve one or two mares at two years of age; but be careful not to breed the jack intended for mares to jennets before you have bred him to at least half a dozen mares; and, in breeding, do not let him serve more than two a day,—one in the

morning and the other in the evening,—and not over forty the first year, nor more than sixty any year. If more are bred, permanent injury to the jack is likely to result. In litigated cases which have come under my notice, the testimony has generally shown that more jacks have been injured by breeding to too many mares at three years old, than at any other age.

Caution should be used during the season to have the jack securely haltered through the day, for some few will watch for an opportunity, when the groom is off his guard, and bite seriously. I once had a jack, seemingly docile, seize his groom by the back, and bite him severely. Jacks, generally, are docile; but until you find out the disposition of your jack, you had better, during the breeding season, give him no chance to do mischief. The application of a good hickory will soon cure his viciousness.

A jennet will carry her foal 12 months, and a jack foal often 13 months; and the owner should be present, if possible, when she foals, for the young of this kind of stock are more liable to be smothered than mule or horse colts.

It should be borne in mind that a young, healthy jack will get his best colts the first season; and if you are using your jack yourself, never permit him to be over-bred.

If your jack is 15 to 15½ hands, and has that height by inheritance, through his ancestry, you can, by breeding him to mares of good size, confidently rely upon having good-sized mules.

The well-bred mule, if properly treated after being weaned, will grow the first year six, and the second year three inches; and if well kept in this way for two years, will have attained its height. Of course, if poorly fed and cared for during the first and second years, they will not mature until three years old; but the stinting business costs the owner one year's additional interest, feed, attention, and care, which never pays."

Mules bred in Arkansas, Missouri, Tennessee, and Kentucky, are generally known to be superior to those of most of the other sections of the country, owing, probably to the fact of the improved jacks being used there more extensively with blooded mares.

**Breaking and General Management of Mules.**—The general rules to be observed in breaking colts, and horse management, are equally applicable to mules; hence, do not require repetition in this connection.

Mules are too often neglected and abused, and from such treatment are frequently made vicious and stubborn from mere self-defense. They are frequently termed stupid and obstinate, but in nine cases out of ten where they are found such, it is due more to the ignorance, stupidity, and brutality of those that reared, broke, or have driven them, than that of the animal. Mules are naturally affectionate and patient, and should be kindly treated. When thus treated, they are very docile, and yield readily.

Their ears, like those of the horse, are peculiarly sensitive, and tender; hence when handling them, it should be done very carefully, and in such a manner that they will know that they are not to be annoyed, or harmed in any way. This will help much in overcoming their naturally timid dispositions, and when they find that they are not to be abused, they will be kind and submissive.

The mule's ears are so extremely sensitive, that a scratch or the slightest injury to them will make them afraid, and have a tendency to arouse stubbornness; and it will be with the greatest difficulty in such cases, that they will for a long time afterward submit quietly to be haltered. Mr. Morris, of Pennsylvania, previously referred to, says respecting mule-breaking: "There is a great prejudice existing against mules in some parts of the United States, but this is most generally the case where they are least used, and, consequently, but little is known of their good qualities, and they are accused of being vicious, stubborn, and ready to kick at anything coming within reaching distance. How common the remark, 'As stubborn as a mule.'

And yet some of the very traits that are so much decried in the mule, are the very best traits that either mule or horse could possess. What is wanted, is to 'train a mule up properly in the way it should go,' and my word for it, 'when it is old it will *not* depart from it.' We should use kindness instead of abuse, and there would seldom be any kicking or biting, and the mule will learn far quicker than most horses what is wanted. Mules are naturally very timid animals, and have a great deal of curiosity. The latter trait I have often observed in driving a number of loose mules along the public highway. They will stop and notice every strange object along the road, and will, occasionally, turn off on by-roads to gaze at something, and yet, to show how quickly they learn, and how easily managed, after a day's driving, a few calls from the driver will generally bring them back to the main road. Some, occasionally, are very roguish, and seem to take a delight in running far enough away from the drove to cause the driver some uneasiness, but, with a little patience and firmness, they are soon broken of the habit. Mules have also a very affectionate disposition, but one peculiarity of theirs (and this same trait is peculiar to the elephant) is that of remembering and resenting an injury; therefore, the more quietly we go about handling and breaking them, the less trouble we will have with them, and the less disposition they will ever possess to kick at any one. A showman once announced, whilst performing his bear, that 'he broke him with kindness,' adding 'and a club.' My advice in breaking mules is, be sure to adopt the kindness part of it, but, under no circumstances, use the club. Many a mule is spoiled by ignorant and thoughtless persons seizing it by the ear and holding on to that sensitive organ until the mule becomes so much afraid that it is almost impossible to bridle it. Some can never be entirely cured of the timidity thus produced."

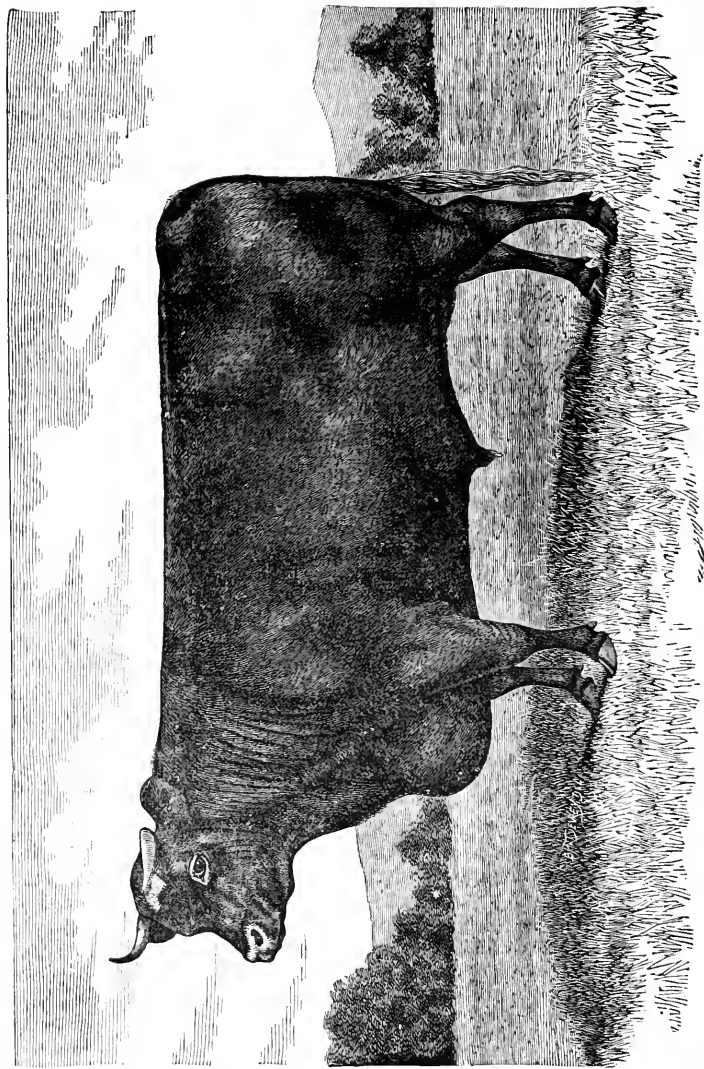
Hon. J. B. Smith, of Pennsylvania, says: "I had the pleasure, once, of owning a pair of mules. I bought them when they were two years old, and made up my mind that they could be broken the same as a horse, if treated in the same way. I got a friend to assist, and we went to work and broke them the same as colts, using them kindly; and a better pair of mules never were used. Any one could drive them. I could hitch them into a buggy together, and they would go well. All you would have to say was 'go.' A mule lives on less than a horse, does more work, and is less liable to die.

"In our minds they are very valuable. We drive one into a gang-way half a mile, taking a light for loading. After the car is loaded and the mule started, he will find his way out over the proper track without any light at all. Then all you have to do is to start him again, and he will go back to where they are mining. I believe the mule should have the same treatment as the horse, and then he will have as kind a disposition. If you whip and scold him every time he does anything wrong, and make a 'scape-goat' of him generally, in course of time he will not mind anybody, not even yourself. But if you treat him right, he will do right in return."

We lay it down as a general principle, that any animal is far more valuable for service of any kind, and hence worth more money, for simply the kind and humane treatment it has received from birth to maturity, and that much-abused animal, the mule, is no exception to this principle.

**Shoeing.**—All that has been said with reference to the shoeing of horses applies with equal force to the shoeing of mules,—the half-brother of the horse. Do not permit the frog or sole of the foot of the mule to be cut, any more than that of the horse, for it will be sure to bring injury to the feet sooner or later. If a mule is troublesome about being shod, blind-fold him by putting a bandage before his eyes, and he will generally yield. Timidity and fear of being harmed will generally be the cause of resistance in such cases, rather than obstinacy. When they cease to fear man, and have confidence in his kind intentions, they will use their heels and teeth less in self-defence, and prove less shy and willful.

**Diseases of the Mule.**—For treatment of diseases of mules, see DISEASES OF THE HORSE, since all remedial agencies apply equally well to both animals.



**FOUR-YEAR-OLD SHORT-HORN STEER, "W.M. ALLEN."**

Winner of 1st prize at Fat-Stock Show, Chicago, 1879. Property of Wing & Thompson, Bement, Ill.

# THE AMERICAN FARMER.

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## PART III (Continued).

### DOMESTIC ANIMALS.

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#### CATTLE.

**T**HE term cattle, in its primary and broadest signification, includes not only horned animals, but the horse, the ass, and nearly all those which have been domesticated. In a more specific and common acceptation, it is applied to the various races of domesticated animals which belong to the genus *Bos*, and is synonymous with *oxen*. Cattle seem to have been among the first animals domesticated by man in the early period of the world's history, as also the most valuable and necessary to his highest welfare in all ages and stages of civilization since that time. In ancient times an individual's possessions were determined by his herds, or rather by the number of his cattle, these being employed as a medium of exchange between different tribes and nations, a practice still common among many of the African tribes.

Naturalists have separated oxen into two classes or groups, the zebus or humped-cattle (*Bos indicus*), such as those of India and Africa, and the common widely distributed race with straight backs (*Bos taurus*). The original wild type from which the various breeds of domestic cattle are descended is not known. The principal and most valuable breeds in the United States have been derived from Great Britain, and other portions of northwestern Europe, especially England, where they have long been bred with such care that they have attained a degree of perfection not found in any other portion of the globe. The old native stock of this country are a mixture of various types, and cannot be classified as belonging to any particular breed. Great improvement has been effected, however, during the last quarter of a century, and even for a period considerably anterior to this, by importing the best pure-blooded animals of different breeds, and breeding therefrom both pure-blooded animals and grades. By this means choice, pure-blooded stock has become more common, and the native or mixed stock of the country has been greatly improved in many sections, while the great interest that is at present manifested in this important branch of agriculture augurs well for the future in this respect. The vast herds of cattle that roam over the extensive pampas of South America, Mexico, and other portions of the continent, are similar in the main to the domestic types to which they owe their origin; and since it is a law of nature for both plants and animals to revert to their original types when not interfered with by man, the conclusion to be derived is that these animals do not in their general characteristics essentially differ from the original source of our present breeds of cattle.

History of American Cattle. (See Native Cattle.)

**Breeds and their Characteristics.**—It is estimated that there are in Europe, at the present time, at least fifteen distinct British breeds, while the number of Continental breeds is considerably larger, all of which, according to Nilsson and Rutineyer, who have given particular attention to the subject, seem to have been derived from three distinct species or races. It is not our purpose, however, to enter into a special description of these different breeds, as it would be neither advantageous nor practicable, being beyond the limits of this work; but we shall rather devote the space allotted to this department to the description and general management of those popular breeds which in Europe and America are noted for excellence in beef and milk production, or dairy use. With cattle, as with other animals, and also plants, climate, cultivation, nature of the elements of food that constitute the sustenance and perpetuate their growth, all have much influence in determining their form, size, and general character. While pure-bred animals have marked characteristics that distinguish them under all circumstances from other breeds, still the qualities that characterize them from others may be modified to a certain extent by a variety of circumstances, such as a change of climate, quality and amount of food, and the general management and care which they receive, particularly when young. There is also a constant natural tendency, as has been previously stated, to revert to the original wild state or condition, and this is only prevented by the careful management and that judicious treatment, which shall have a tendency to develop and increase the valuable qualities of the animal. When such a course is pursued through several generations of the same family, or race of animals, the qualities which it has a tendency to develop become after a time fixed to a greater or less degree, and are capable of being transmitted to the extent that they are peculiar to the race, and thus the permanent characteristics of the breed are established. We therefore have breeds suited to the special production of the largest amount of beef with the least offal or waste; those noted for their production of milk and cheese, others for butter, and others still whose chief excellence seems to be in their use for labor as working oxen.

Thus we have the heavy beef breeds or early maturity in the Short-Horns and Herefords; the breeds noted as being producers of large quantities of milk peculiarly rich in casein, as the Ayrshires and Dutch or Hollanders; and those especially noted for butter production in the Jerseys, Guernseys, etc.; while the Devons have long been prized for their beauty, activity, and general utility as working oxen, besides possessing valuable qualities as beef and milk producers. While each breed has certain marked characteristics that distinguish it from every other, still individuals of the same breed will be found to differ very materially, some possessing the desirable characteristics in a much greater degree than others; therefore, in breeding, those animals should be selected that most fully represent the qualities that are desirable to be transmitted.

While some breeds possess both beef and dairy qualities in a good degree, it will frequently be found that the breeds most profitable for beef production are, as a general rule, not profitable for the dairy, the latter qualities having been sacrificed to the production of beef, as is instanced in the Short-Horns, which were formerly very good milk yielders, but have deteriorated in this respect in the improvement of their beef qualities. The breed most profitable for the cheese dairy may not be the most profitable for the creamery or butter dairy, while the one that yields the largest quantity of milk may not be the most profitable for either, since the *quality* of the milk is of the first importance in determining its use for a specific purpose, while the breeds that would be most profitable for either of the above-mentioned purposes might prove very unprofitable for beef production. It would, therefore, be impossible to answer the question so frequently asked, as to *which breeds are the best?* since in selecting any breed the farmer must take into consideration the object to which it is to be devoted, the adaptation to locality, and other circumstances.

It may frequently be found best, as might be the case with the general farmer, to secure

as far as practicable a union and harmony of all the good qualities in the breed, and such as when ceasing to be profitable in yielding milk, will fatten readily, and bring a good price for beef in the market. In other cases the butter qualities will be regarded as most essential, and the selection should be made with special reference to this object. While the beef and dairy qualities are in a strict sense antagonistic, and therefore generally regarded as incompatible, they will be found to be combined in a much greater proportion in some breeds than others. Writers generally divide British breeds of cattle into four distinct classes: the short-horned, middle-horned, long-horned, and polled or hornless. The authority previously quoted says of these classes:

"They all have, or until recently, had their own various localities and districts in the several parts of England and Scotland, where they have existed from a remote period. Each were favorites among the farmers and breeders of their homes, rarely taken out of their districts, except for market, and until after the middle of the last century, like the people who reared them, strangers to other parts of the kingdom, and migrating back and forth no farther than to the nearest market towns, or district fairs. Thus they became homogeneous, deeply interbred among their own tribes, and closely retaining their own distinctive qualities, uncontaminated by the blood of other breeds, and transmitting their qualities and characteristics with a pertinacity and truth, of which those giving the subject little study can scarce realize. As such they have come to us, and only as such we know them."

The most numerous of the improved breeds in this country, are the Short-Horn, Devon, Ayrshire, Jersey or Alderney, while the Hereford, the Dutch, the Guernsey, and the Swiss, are found to a certain extent. Besides these the Brittany, Galloway or Polled, Kerry, and other less common breeds are occasionally seen.

**Adaptation of Breeds to Localities.**—It is very important, in order to secure the highest success in either beef production or the dairy product, that the selection of breeds should be made with due regard to locality and the attendant conditions; for while all the improved breeds have their peculiar characteristics and good qualities, some are much better adapted to certain localities than others, possessing in the abstract equal or perhaps superior qualities. For example, it will be found that in those localities where grass is not abundant, and pasturage poor, a small or medium-sized breed can be better sustained from such lands, and more milk in proportion to the food consumed be obtained, than from the largest sized breeds. In the great variety of our climate and soil, there will, therefore, be found localities more or less adapted to all our improved breeds, a fact that has been well set forth by one of the leading Western journals, in the following:

"All breeds cannot be equally appropriate for all places. Where food is scanty, and the land rough or hilly, the small breeds are undoubtedly best adapted to the situation. These are nimble in climbing steep, and thrive on scantier herbage than the large-formed and heavy-bodied breeds. Such localities are better adapted to dairying as a speciality than beef growing; and here is a natural adaptation for the Ayrshire, Jersey, Guernsey, Devon, Kerry, and Swiss cows, or crosses of these upon mixed stock. As grain is not so largely raised here, special fattening for beef would not, perhaps, be very profitable; yet we always advise the joining of dairying and beef growing, so far as to make a proper use of all the calves, and of fattening the dry cows. In this case beef production is a mere incident to the main business of dairying—profitable in that connection, but not as separated from it. These breeds may be fed to a weight, in the cows, of 800 to 1,000 lbs., and the males from 1,100 to 1,400 lbs. at three years old, or 800 to 1,200 lbs. at two years old, and the latter system may be followed with profit. The refuse of the dairy will furnish a large portion of the food for the first six months, and, besides grass and hay, only a few bushels of grain or other food will be required to fit them for market. And as these lands are found principally in the Eastern States, all the beef, young or old, finds a ready market within a few miles of the producer.

Skillful feeding may grow and fatten these animals at a fair profit. These moderate-sized cattle, well fattened, are prime in quality, and will bring a full price. This will also improve the dairy system of the Eastern States, by utilizing all their products; and, besides producing much of the beef required in the local markets, will raise all the heifers necessary to replenish the dairy herd. This is matter of the greatest importance to the success of any proper system of dairying, as purchasing cows in a miscellaneous market is incompatible with the selection of an extra herd. This can be done only with home breeding, or the selection of a tried cow here and there.

We do not intend to say that in all parts of the Eastern States only the small breeds of cows are desirable—for quite the reverse is the case—but that these States furnish a large amount of land where these breeds are most appropriate. But when we reach the great Western plains, where the natural grasses grow in abundance, and where grain is produced with much less labor, here is the natural home of beef growing, and here the grandest animals are required to produce it most profitably. Here the mature bovine animals should weigh from 1,400 to 2,000 lbs., and be able to reach this weight at two and a half to three years old. Here your quiet, docile, large-eating and large-producing cow is the one required, since the largest machines pay best when you have the material to run them. That breed which will produce the largest amount of beef, milk, butter, and cheese in a given time, and from a given amount of food, is the one required. It has come to be acknowledged as a fact beyond reasonable controversy, that large cattle, of equally early maturity, produce the largest result in beef from a given amount of food; and, if of a milking breed, also the largest amount of milk from a given amount of food.

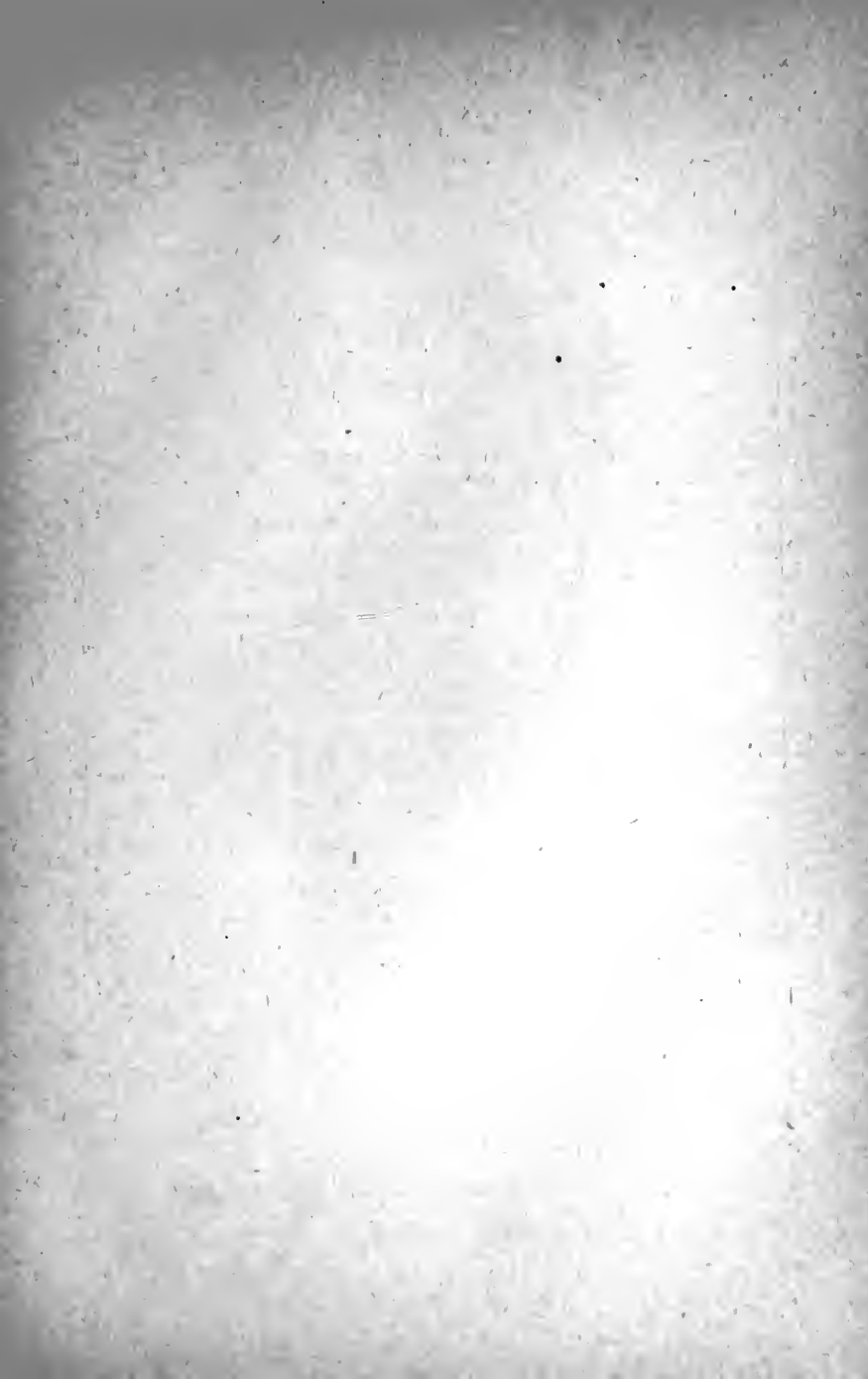
In England beef growing is never carried on singly, but milk is counted on as carefully as the meat; and, after a century of selection for the large milk dairies near London, and other large towns, the high-cross Short-Horn cow is used as the milk producer. This blood is there found satisfactory in milk production, as it is everywhere for meat production.

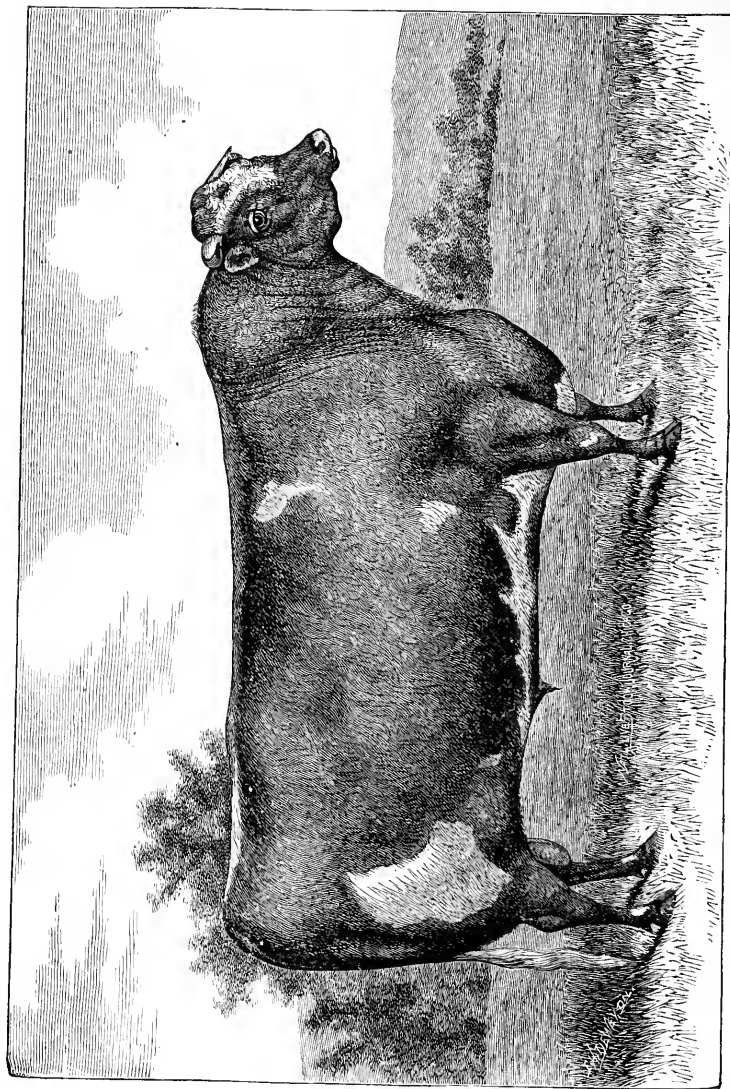
The Holland or Dutch cattle have a weight nearly equal to the Short-Horn, and have the great merit of having the milk secretions well developed and permanently fixed in the race. They feed into large, compact carcasses of beef, but are not as fine-boned and smooth as the Short-Horn, and many suppose them to have been the origin of Short-Horn blood. They are a fixed race, and transmit with certainty their characteristics to their progeny, and may, therefore, be used to improve the common stock for milk and beef. They are very large milk yielders, and will be of much advantage in building up the Western beef and dairy interest.

The Hereford is another large beef breed, having in this particular great merit; their advocates regarding them as fully the equal of the Short-Horn in early maturity, and as economical feeders for beef. As milk producers they have as yet little general reputation, either in this country or Europe. We have known a few fine milkers, which renders it highly probable that they may yet become developed in this particular, and that their general character in this respect may be owing to the fact that they have been kept mostly in grazing, and not in dairy districts. They possess remarkably fixed characteristics of race. No race is more prepotent; and when their milk yield shall be increased, they must be a most important addition to the beef and dairy breeds for the development of the West. The hardness of this breed, and its adaptation to grazing districts, are unquestioned.

The West has not only abundance of grasses, but also abundance of grain, both for the production of beef and milk. This gives it all the resources requisite to the most assured success in the double enterprise."

In the selection of breeds for any purpose whatever, their qualities or characteristics should not only be considered, but the object to be secured in the enterprise, and the adaptation of the location to the attainment of the most successful results.





**SHORT-HORN BULL, "2d DUKE OF NORTHUMBERLAND."**  
Property of A. Winslow's Sons, Putney Stock Farm, Kankakee, Ill.

## SHORT-HORNS.

**T**HIS breed of cattle has without doubt been more popular and also more widely disseminated during the present century than any other, both in this country and Europe. Their history is too well-known to require repetition, being an old and well-established race. They were greatly improved and brought into general notice during the latter part of the last century, by the efforts of a few enterprising breeders in the valley of the Tees, England, and were formerly variously termed Durham, Teeswater, and Short-horn cattle. The counties of York and Durham were especially noted for these cattle, and in 1783 the Durham County Agricultural Society was formed, its first fair or "cattle show," as it was called, being held in 1784. The establishing of this agricultural society had an influence in stimulating the stock breeders of that time, since it inaugurated a demand for better stock and increased care in breeding. The Colling brothers, Robert and Charles, noted for the great improvements they effected in this breed, are mentioned as being exhibitors of Short-horn cattle at these early fairs, and also as being the first persons of that time who systematically fed and cared for their breeding stock, with a view to improving it to the degree of producing the best possible development; a new theory for that period. Since that time, great improvements have been effected in this breed, especially in the beef-producing qualities, which have been carried to the extent of deteriorating the milk-producing characteristics which they formerly possessed, and which is at present the aim of some breeders to endeavor to restore. Their chief merits at present, as a breed, evidently are in beef production, and they are most profitably bred for that purpose, since their milking qualities have unfortunately been so much neglected in breeding that generally the best cows for beef are very inferior milkers, and in sections in this country, where they attain the highest perfection in form and beauty, they are frequently not milked at all, the calf being allowed to run with its dam. Early maturity, symmetry of form, large size, with good fattening qualities are their chief characteristics. Specimens of this breed have brought at times enormous prices. Hon. E. H. Hyde of Connecticut says of them:

"They are celebrated all over the country for their large size and symmetrical beauty, and for the fabulous prices they have brought. There was a heifer calf of this breed sold in 1875 for twenty-seven thousand dollars,—more valuable, indeed, than the golden calf which Aaron set up for Israel to worship. It was the highest price ever paid for a year-old creature in all beastdom. This calf's mother and her progeny sold for over a hundred thousand dollars."

The *Encyclopædia Britannica* (vol. 1, page 388), contains the statement, that in 1873 the herd of Mr. Campbell, of New York Mills, near Utica, was sold at auction, at which time 108 animals realized \$380,000. Of these, 10 were bought by English breeders, six of which, of the Duchess family, averaged \$24,517, and one of these, the "Eighth Duchess of Geneva," was bought for Mr. Perrin Davies of Gloucestershire, at the unprecedented price of £8,120, or nearly \$40,000. In 1877 Mr. Simon Beattie of Annan imported a number of short-horns from Mr. Cochrane of Canada, the proceeds of the sale amounting to £17,150 sterling, the price of 4,300 guineas being paid for one cow. But prices approximating to such figures are rare exceptions, although really fine animals of any breed will command high prices.

The short-horn breed requires probably better care and feed in order to develop its best qualities than almost any other. Hence, good pasturage in summer and liberal feeding in winter are essential to this object. The blue-grass region of Kentucky is especially adapted to the highest development of this race of cattle, and the animals grown here are generally noted for their superior excellence. They are at present bred in New England, the Middle and Western States, also in Canada, where Mr. Cochrane of Hillhurst has propagated one of the choicest strains of the breed by his valuable importations and careful selections in breeding. Good care and management and liberal feeding, as we have previously stated, are essen-

tial to the highest development and success with this race, and while they will, under these circumstances, thrive well, they will not endure neglect and stinted feed without greatly deteriorating in condition. Short-horn cows that prove poor milkers will always make good beef, which cannot be said of some other breeds, and their calves are also worth more to the butcher than those of the smaller breeds that are especially valuable for dairy use.

Prof. Low, a well-known English authority, says respecting this breed:

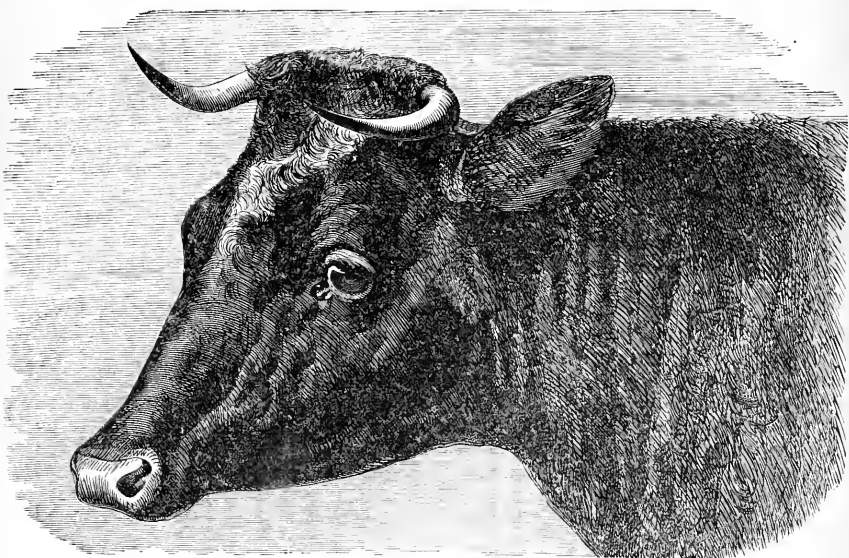
"The multiplication in this country of a breed so greatly improved by art must be regarded as highly conducive to the improvement of this branch of rural industry. A large part of the cattle of England consists of a mixture of races having no uniformity of characters, and generally defective in some important points. The possession of a breed which can always be resorted to for crossing these mixed and defective races, is a great means of improvement, applicable to a class of animals that require it the most, causing the larger cattle of the country to approach a better model and assume a greater degree of uniformity. Further, the extension of the pure breed, and the multiplication of its numbers, are conducive in a high degree to its own permanence and improvement. When but few cultivators of it were to be found, the system of breeding from animals of the same family, and from the nearest affinities of blood, could scarcely be avoided by those who wished to preserve their stock from deterioration; but now so many fine animals are reared of the same race that no one is laid under the necessity of breeding solely from a few individuals; and in the future cultivation of the breed, hardiness, soundness of constitution, and the milking properties of the females may all receive their due share of attention. The external form has been already brought to all the perfection which art seems capable of communicating, and now those other properties remain to be attended to, without which no further refinement of breeding will avail for the purposes of profit to individuals and benefit to the country."

Absolute perfection in breeding is perhaps an impossibility, but could we combine the fine milking qualities possessed by the Jerseys with the size, symmetry, beauty, aptness to fatten and other fine beef qualities of the short-horn, the breeder of such an animal might well feel that he had attained a standard in his art, which might properly be called a creative art,—beyond which his ambition or imagination for improvement could scarcely extend.

**Description of Short-horns.**—One of the best descriptions we have seen of this breed is that given by Allen in his "American Cattle;" and without attempting to improve upon it, as we indorse it in all respects, we quote it as follows: To begin with the head; "the muzzle should be fine and yellowish, or drab in color, not smoky or black; the face slightly dishing, or concave; the eye full and bright; the forehead broad; the horns showing no black except at the tips, and standing wide at the base, short, oval-shaped, spreading gracefully out, and then curving in with a downward inclination, or turning upward with a still further spread (as either form is taken without prejudice to purity of blood in the animal), of a waxy color, and sometimes darker at the tips; the throat clean, without dewlap; the ear sizable, thin, and quickly moving; the neck full, setting well into the shoulders and breast, with a slight pendulous hanging of the skin, (not a dewlap,) just at the brisket; the shoulders nearly straight, and wide at the tops; the shoulder-points, or neck-vein, wide and full; the brisket broad, low, and projecting well forward, sometimes so much as almost to appear a deformity; the arm gracefully tapering to the knee, and below that a leg of fine bone, ending with a well-rounded foot; the ribs round and full, (giving free play to vigorous lungs,) and running back well towards the hips; the crops full, but as a rule scarcely equal in fullness to the Devons; the chine and back straight from the shoulders to the tail; the hips uncommonly wide, and level with the back and loin; the loin full and level; the rumps wide; the tail set on a level with the back, small and tapering; the thigh full and heavily fleshed; the twist wide; the flank low and full; the hock, or gambrel joint, standing straight (as with the horse), or nearly so; the hind leg, like the fore one, clean and sinewy, and the foot small.

The true colors of well-bred short-horns range from pure white to deep red; and between these colors, either of which frequently comprise the whole animal, their intermixtures in all variations of roan; as light roan, with the white predominating over the red; red roan, with the red prevailing over the white, as either may over the other in different degrees; red and white flecked, or spotted in every possible way. The red may also vary in shade from light, or yellow-red, into the deepest mahogany. The old-fashioned short-horns sometimes showed a drab-dun, or fawn color, mixed with white, which we have in some instances seen crop out in one of later days. We have also seen a very few instances of dark brown roan—almost smoky in shade, among those of excellent quality, and unimpeachable pedigree. But the clear white, and full red colors, either by themselves or intermixed in various beautiful and picturesque proportions, are the prevailing colors of our own time."

It thus appears that this breed differs from most others in the symmetry and rotundity of its carcass, as well as the small amount of bone and offal that it has, in proportion to the amount of flesh it is capable of producing that may be converted into good beef.



The above cut represents the head of "Aurora," a beautiful specimen of this breed formerly owned by H. G. White, of South Framingham, Mass. An American agricultural authority recently writes from England, that the great mass of British short-horns are roans, and these often light roans; next to the roans he thinks the whites would come; then red and white, with the reds last. In order to verify his opinion, he took the trouble to notice the catalogues of the Kilburn and Perth shows, and found that, of 76 bulls entered at Kilburn, 49 were roans, 14 white, 10 red and white, and 3 red; of 90 cows and heifers, 66 were roans, 11 red and white, 8 white, and 5 red. For the Perth Show 47 bulls were entered, of which 31 were roan, 9 white, 3 red and white, and 3 red; of 43 cows, 29 were roan, 6 red and white, 6 red, and 4 white. Thus of a total of 256 short-horns, thought fit for entry at the two leading fairs of the kingdom, 175 were roans, and 20 were reds.

**Short-Horns for Beef.**—No breed can probably be found that possesses more desirable qualities as a flesh-producing animal for the general market than the Short-Horn, and no breed has attained a popularity so great and a distribution so wide during the last century, as this. Some other breeds, such as the Devon, the Highland and Galloway cattle, it is generally conceded, produce flesh of somewhat finer grain, and more tender quality, but these are smaller and less profitable for this purpose generally than the Short-Horn, which is particularly noted for size and weight, early maturity, aptitude to fatten, and fine bone structure, thus furnishing a large proportion of meat of fine quality with a small proportion of waste. We therefore have in the Short-Horn an animal that will produce a large amount of flesh in the most desirable portions, ripen for the shambles early, easy to fatten, and that will produce the largest amount of meat with the least of fat of any breed, unless it be the Hereford, which is considered by many equal to the Short-Horn in this respect. Short-Horns will not, however, prove as profitable where grass is not abundant, as some other breeds; for while an abundance of good pasturage in the grazing season, and liberal feeding in winter are essential to the successful development of the best qualities of any breed, more especially is this true of the Short-Horn. They will not thrive on limited feed or neglect of any kind.

The objection is sometimes urged, that the rapidity with which they attain their growth and fatten prevents their meat from ripening sufficiently before appearing as beef in the market, and also that there is a disproportion of fat to the lean meat which is not found in breeds of slower growth and maturity; but we do not consider these objections sufficiently well founded to deserve much attention, and taking all things into consideration, we know of no breed better adapted to beef production for the general market, in localities suited to it, than the Short-Horn, while we know of none that will more quickly transform the native stock by crossing, than this. The Short-Horns and their grades produce some of the very finest beef to be found in the markets of the country. It is greatly superior to that furnished by the native stock, and consequently commands a much higher price. The production of such beef not only proves more profitable to the breeder and grazier, but to the purchaser and consumer, bringing as it does the quickest and most profitable returns to the breeder and grazier for the capital invested and food consumed, and the best returns to the purchaser for the market, as its fine quality causes it to be in great demand, and to command the best prices.

When well cared for with winter forage and shelter, both native stock and Short-Horn being kept in the same herd, the former at a year and a half will attain the weight of from six hundred to eight hundred pounds, while the latter will average from a thousand to twelve hundred pounds. At two and a half years the native will have reached the weight of a thousand pounds; the Short-Horn from twelve hundred to fourteen hundred pounds. At three and a half years the native may perhaps attain to the weight of twelve hundred pounds, and the Short-Horn to from fifteen hundred to two thousand pounds; the native would be still unripened and consequently not in prime condition for market, while the Short-Horn will have attained full maturity, and bring a much higher price than the native. As a market animal, the native steer is not fully matured at less than four and a half or five years, while, as previously stated, the Short-Horn steer reaches this period at least a year sooner. The latter also matures for the slaughter fully as soon as the Devon and Hereford, and a year sooner than the Galloway.

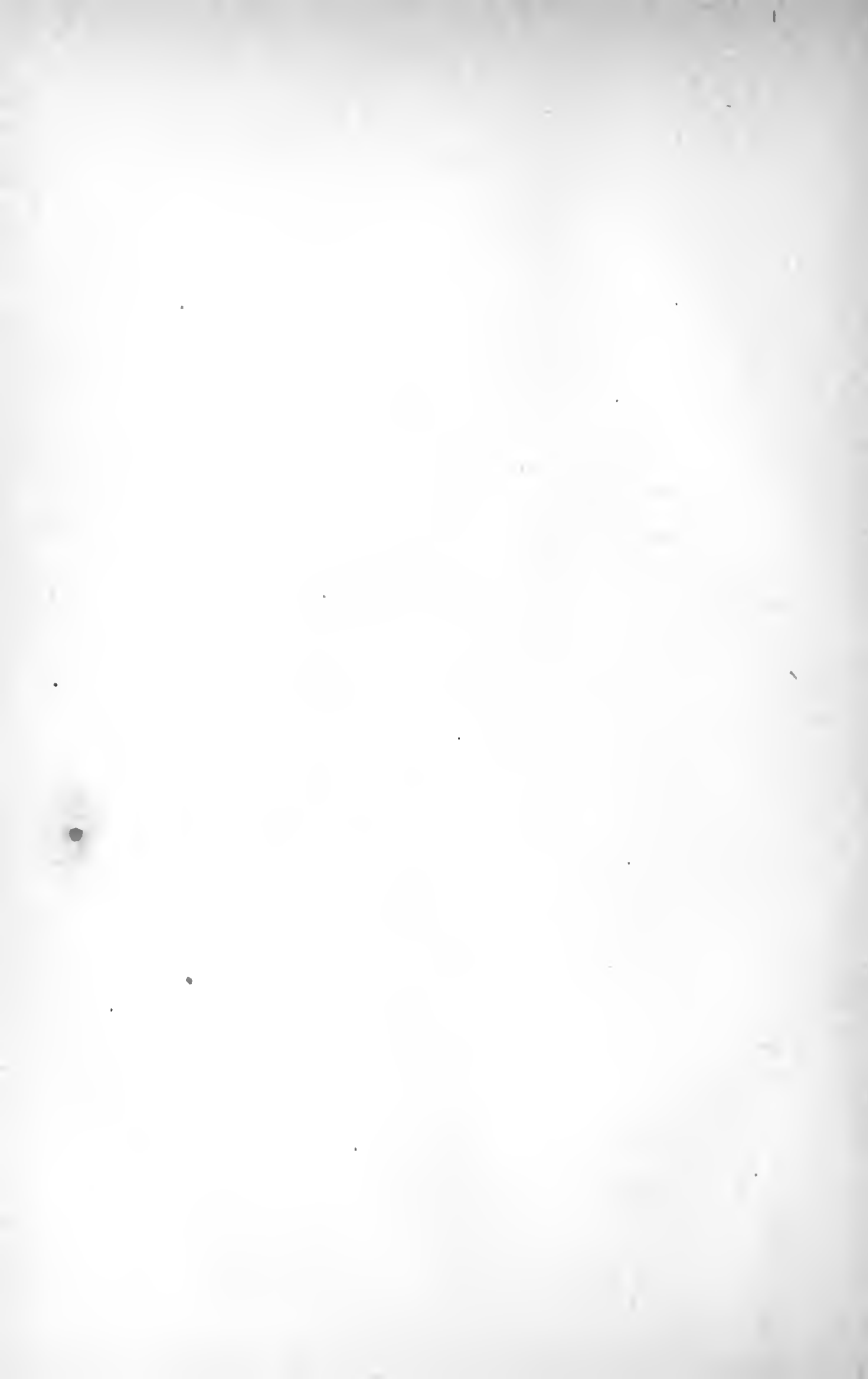
**Short-Horns as Milkers.**—There are properly three classes or families of Short-Horns, viz.: those which have been bred for beef production principally, those which combine the qualities of beef production with that of the production of milk, and those which have been bred more particularly with a view to milk production. While some fine milkers may be occasionally seen among the Short-Horns, the majority of breeders of this class of cattle have for some time past almost ignored, or at least greatly neglected the milking qualities in their efforts towards securing the highest possible degree of perfection for



SHORT-HORN COW, "THE DUCHESS OF HILDHURST."

Property of M. H. Cochrane, Compton, Canada.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



beef; hence it has brought about the result, that while the Short-Horns were formerly known to be fine milkers, they have greatly deteriorated in this respect, and those types of the breed that furnish the best specimens for beef production are generally very inferior milkers. It now remains for the breeder to restore the milking qualities of this valuable breed, and at the same time to endeavor to do this without deteriorating their present standard in beef production, which many breeders are attempting to do. That this may be done by judicious management and careful selection in breeding is doubted by many, since the two qualities are to a certain extent antagonistic, but is believed practicable by some of our most enterprising and successful breeders. It is a well known fact that the dairies of London were formerly stocked principally with Short-Horns and Yorkshire breeds or their grades, which, after furnishing a profitable supply of milk for some time were easily and readily fattened for beef. As regards the former general excellence of this breed for the production of both milk and beef, we cite the noted English authority, Youatt, who says:

"The number of cows kept for supplying the metropolis and its environs with milk is 12,000. They are, with very few exceptions, of the Short-Horn breed—the Holderness and Yorkshire cow—and almost invariably with a cross of the improved Durham blood. The universal preference given to this breed by such a body of men, differing materially on many branches of the treatment of cattle, is perfectly satisfactory as to their value, and that on three distinct points. First, as to the quantity of milk. This we need not press, for the enemies of the Short-Horns have never contested this point. There is no cow which pays so well for what she consumes, in the quantity of milk that she returns. This, however, is not all, though it may be the principal thing which enters into the calculation of the metropolitan dairymen. \* \* The proprietor of the large dairy is also a dealer in cream, to a considerable extent, among these people; he is also a great manufacturer of butter—for he must have milk enough to answer every demand, and that demand is exceedingly fluctuating; then it is necessary that the quality of the milk be good, in order that he may turn the overplus to profitable account in the form of cream and butter. The employment of the Short-Horn cow in all the dairies is convincing proof that her milk is not so poor as some have described it to be. It is the practice in most of the dairies to fatten a cow as soon as her milk becomes less than four quarts a day. They are rarely suffered to breed while in the dairyman's possession. The fact of their being so often changed is proof that while the cow gives a remunerating quantity of milk for a certain time, she is rapidly and cheaply fattened for the butcher as soon as her milk is dry. Were much time or money employed in preparing her for market, this system would not answer, and would not be so universally adopted. Fattening and milking properties can therefore combine in the same animal, and they do so here."

The very fact of this breed having been valuable milkers in the past, and that some families of it are at present, proves that the race can be brought to that standard again, when the proper means are resorted to to attain such a result.

**Short-Horns as Working Oxen.**—Although the pure-bred Short-Horns are used for farm work and draft in some sections, yet their size, weight, aptitude to fatten, and slow movements are objections to their general recommendation for this purpose, in those sections where ox teams are employed; and for these reasons they are not as desirable for this use, as the more active Herefords and Devons, or crosses with these or the native stock, either of which make excellent workers.

## DEVONS.

THESE beautiful cattle date back to great antiquity; in fact, there is no well established breed in this country or England that dates back so far. It is claimed by some writers that they were known in England at the time of the Roman invasion. Be this as it may, their origin is involved in obscurity, and the blood of no other known breed can be traced in them. They are of beautiful form and color, admirably adapted to hilly countries and scant pasturage, as well as combining the three distinctive qualities of milk-production, beef, and labor. The chief objection to them seems to be in their small size. In the latter respect different families vary considerably. Those of the southern part of the county from which the breed derives its name are large in size, and their bones and muscles of coarser texture than those of the northern portion, while their aptitude to fatten is less, although they possess superior milking qualities.

The portion of this country in which this breed is most numerous, is perhaps New England and some of the middle States, although it is quite extensively disseminated in some of the Western and Southern States. In a special article written expressly for this work, Hon. J. Buckingham of Ohio says:

"In all his points the Devon is the finest formed and most blood-like of cattle. He is to his congeners what the Arabian is to other horses.

Goodale defines the difference between a race and breed as follows: Races are varieties moulded to their peculiar type by natural causes, with no interference of man, and no intermixture of other varieties; that have continued substantially the same for a period beyond which the memory and knowledge of man does not reach. Such are the North Devon Cattle.

By breeds are understood such varieties as were originally produced by a cross or mixture, and subsequently established by selecting for breeding purposes only the best specimens and rejecting all others. In process of time deviations become less frequent, and greater uniformity was secured, and this is in proportion to the time which elapses, and the skill employed.

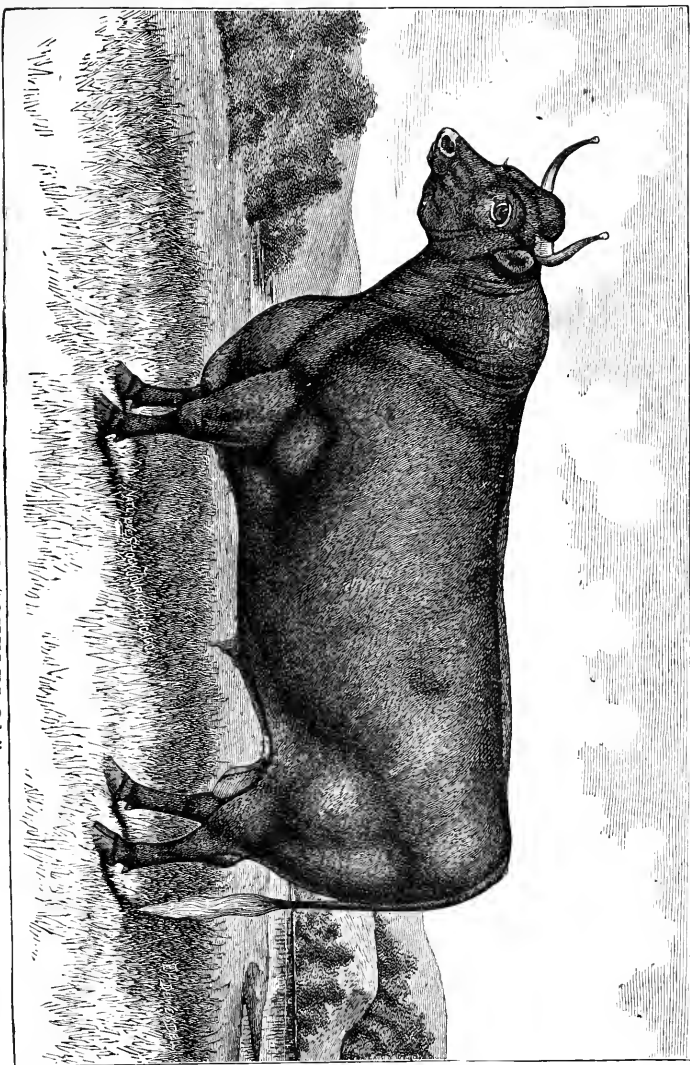
Writers on cattle divide them into three varieties; the Short-Horn, originally found in northern and eastern counties of England; the Middle-Horns in the western and southern parts, and the Long-Horned in the midland counties, and in Ireland; all agreeing that the 'Middle-Horned,' of which the Devons form one variety, are descendants of the aboriginal breed of Great Britain.

The North Devons (commonly called Devons) are a race of cattle indigenous to the county in England from whence they take their name, where from time immemorial they have reigned alone, admired for their beautiful red coats, elegant form, good disposition, active gait, and also for their strong vitality, as is shown in their power of reproducing their own form, color, and general characteristics in their progeny or their grades. The country and climate had much to do in the muscular development and constitutional vigor, which are so naturally fixed and perfected that crossing with any other breed would be more likely to injure them than improve them.

Originating centuries ago, when the wild grasses afforded them scant feed, it necessitated continued exercise in hunting for and gathering their subsistence.

By such natural exercise continued through many generations, the muscles of the breed have been developed and rendered compact, and their bones solidified, till each bears a due proportion to the other, and both to the size of the body in all its parts, producing a form of the most beautiful symmetry.

The bulls, on an average, weigh from 1,600 to 1,800 pounds, though when transferred



NOKTH DEVON BULL, "SHELTO 2d."  
Property of Gen. L. F. Ross, Avon, Ill.



to our rich valleys of blue-grass pastures and corn, not unfrequently reach 2,000 to 2,200 pounds."

**Description.**—The color of the Devon is of a deep red, great pains having been taken by breeders of the improved families of this breed with respect to this point, in the selection for breeding purposes, those having any tendency to materially deviate from this color being rejected. This characteristic has been fairly established, and their color, as well as other strong points, is stamped with absolute certainty on their offspring. To such an extent is this true, that when the Devon bull is crossed with the native and grade cows of whatever color, the progeny will, with very rare exceptions, be red like the sire, while there is no race of cattle in which any admixture of other blood may be so easily traced.

The head is finely formed, and well set, being lean, rather short, broad between the eyes, and a face somewhat dishing, tapering to a fine flesh-color or slightly yellow muzzle. The horns are of medium length, or perhaps might be called rather long, cream-colored, black at the tips, upright, and curving outward. The eye is bright, full, mild in expression, rather large, and is surrounded by a yellow-tinted ring. The skin is thin and yellow, hair of medium length, soft and silky, neck rather long, with veins full and smooth, little or no dewlap, shoulders somewhat slanting, chest wide and full, back straight and broad, ribs round and well expanded. The flanks are full and deep, and the hips rather wide, and level with the back. The legs are small, flat, and sinewy; tail full at the setting, and tapering towards the end, usually terminating with a bunch of white hair. The size of the Devon is somewhat small, when compared with our native stock. Oxen, however, when full grown, will range in live weight from thirteen hundred to sixteen hundred pounds; bulls from a thousand to thirteen hundred, and cows from eight hundred to a thousand pounds.

Our illustrations of this breed are faithful and life-like representations, being made from photographs of the living animals (as indeed all our plates of animals are), and not only this, but of the best type of each species and breed to be found in the country.

**Devons in the Dairy.**—The Devons were formerly more celebrated as milkers than at present, the improved race being regarded as medium in this respect. The quality of their milk, is however, rich, and superior to that of many of the heavier milking breeds.

Their milking qualities have in a measure deteriorated through efforts towards improvement in other respects, but that they have been used with profit in the dairy, will be seen by the following records of yield which have been obtained from various authentic sources. Mr. C. S. Wainwright of Rhinebeck, N. Y., made fourteen pounds of butter per week from Helena; F. P. Holcomb of New Castle, Del., nineteen and one-half pounds a week from Lady; Hon. H. Capron, formerly of Robin's Nest, Ill., twenty-one pounds in nine days from Flora 2d. C. P. Holcomb, New Castle, Del., in twelve weeks, made from one cow  $174\frac{3}{4}$  pounds of butter, or an average of fourteen pounds nine ounces per week; during one week she made nineteen pounds, and in three days nine and one-half pounds; W. L. Cowles, Farmington, Conn., sixteen and one-half pounds in ten days; J. Buckingham, Duncan's Falls, Ohio, in three months, from four cows, an average of forty-four and one-half pounds per week, besides using the cream and milk in a family of seven persons; L. G. Collins, Newark, Mo., from the dam of Red Jacket, sixteen and three-fourth pounds per week; Mr. Coleman, twenty-one pounds per week for several weeks in succession; Mr. Hurlbut of Connecticut, from Beauty, averaged sixteen pounds per week during the month of June, when she was sixteen years old; E. H. Hyde, Stafford, Conn., from Gem,  $215\frac{1}{4}$  pounds of butter in ninety-five days, an average of over two and one fourth pounds per day.

It is generally supposed that the rotundity of form and compactness of frame which contribute so much to the remarkable beauty of the North Devon cow—a peculiarity of form which disposes an animal to take on fat readily—is incompatible with good milking qualities,

and Youatt in this connection expresses the opinion that "for the dairy the North Devon must be acknowledged to be inferior to several other breeds. The milk is good, and yields more than the average proportion of cream and butter; but it is deficient in quantity." He also maintains that the milking qualities could not be improved without probable or certain detriment to the grazing qualities.

The editor of this work some years since had occasion to examine several animals from the celebrated Patterson herd, which would have been regarded as remarkable milkers, even among good milking stock. They had not, to be sure, the beautiful symmetry of form and fineness of bone which characterize most of the modern and highly improved pure-bred North Devons, and had evidently been bred for many years with special reference to the development of the milking qualities, great care having been used to select both sires and dams from the best milking stock, rather than that of the finest forms. The Devon has been bred principally for beef and labor, rather than for dairy use, and its chief merit lies in this direction.

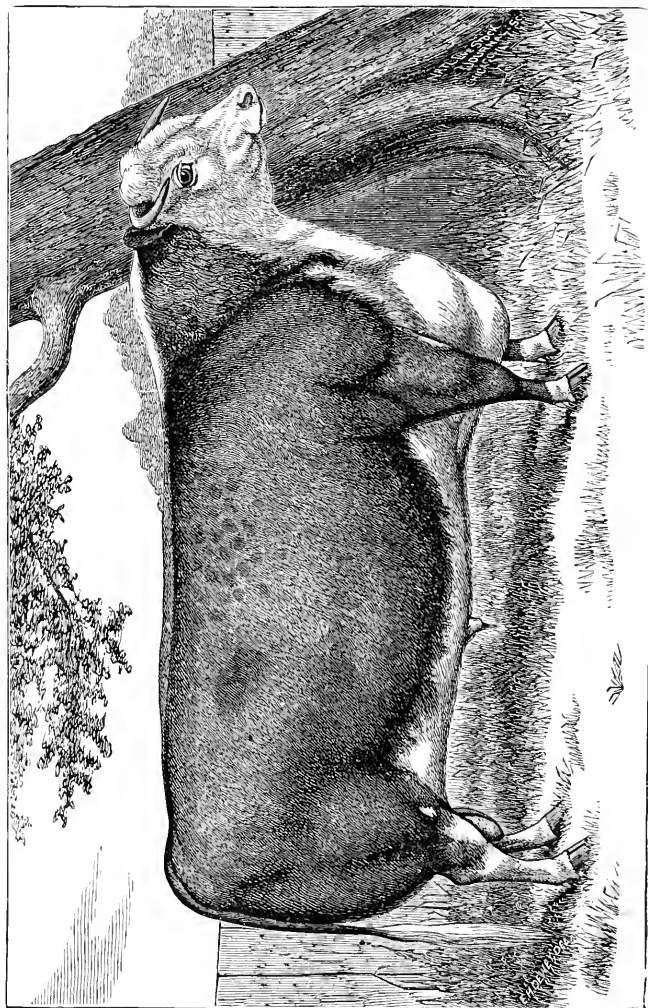
**Devons as Working Oxen.**—As a working ox, this breed may perhaps very justly be said to excel all others in beauty, intelligence, activity, docility, strength according to size, and the ease with which animals may be matched. They are very fast walkers on the road, and are ambitious workers, while they possess great endurance. Care should be used, however, not to overload them, or test their strength too severely, as they are of small size. They are, however, suited to all the ordinary labor of the farm, and are more hardy than some of the large breeds. Mr. Buckingham, to whom previous reference has been made, says of this race of cattle in this connection: The Devon ox grows much larger than the bull or cow; he has a long, large, symmetrical frame, with a clear, sharp-looking head, prominent eyes, flesh-colored nose, and handsome upturned horns, which are quite fine at the point. Shoulders quite oblique and well placed, his ribs well sprung from a straight back; hind quarters full and heavily muscled; his fore-arm thick and strong, but small below the knee, with good solid hoofs. I have seen two yoke of Devon cattle, weighing 3,600 and 4,000 pounds to the yoke, trot off with an empty wagon for two and one-half miles without walking a step, and then haul back 5,000 pounds of coal. The same oxen hauled 4,500 pounds of potatoes ten miles to the city, and back empty every day in the week, making the trip as quick as a good pair of horses with only 2,500 pounds of a load. At any time they can be soon fattened for the shambles, and the price of their meat at Smithfield, England, testifies to the quality of the same.

In the rocky farming districts of the New England States, Devon oxen are almost a necessity. At all events, no intelligent farmer in New England who has rocky soil to till, and once possessing them, will ever consent to be without them afterwards; for on rough lands and hilly roads they are as good as the horse, without being as expensive to keep. Besides when *well kept*—and oxen should always be well kept—if accident befall them, they can be turned over to the butcher with little, if any loss; whereas the horse under similar circumstances would be a total loss.

As a draught ox, the Devon does not equal the Hereford, because less in size and weight; but in proportion to size and weight, no ox of any breed whatever can either out-draw or outwork him.

**Devons for Beef.**—There seems to be a fineness of flesh and a delicacy of flavor in the Devon beef not excelled by that of any other breed, except it be the Highland breed of Scotland, which usually brings a little higher price in the London markets than any others; while in this country the Devons are generally first selected from the herds by butchers, where they can be found, being regarded as more choice and marketable than any other breed. The beef from this breed, in fact, possesses all the fine qualities combined, being fine-grained,





**HEREFORD BULL, "SUCCESS."**  
Property of T. L. Miller, Beecher, Ill.

tender, juicy, fine flavored, and nicely marbled, or rather the lean and fat are well intermixed. It fattens readily, and matures in about the same time as the Short-Horn.

Though small in size, it is claimed by many breeders with whom they are especial favorites, that for the food consumed, they return as large a proportion of beef as the larger breeds. We think, however, that the offal or waste from several small cattle must be somewhat greater than that of the same live weight of larger breeds. They mature nearly as soon as the Short-Horns, and fatten readily. Dr. E. H. Woodward of Wisconsin says of them: "The progress and improvement of the Devons has continued steadily onward, not only retaining all the estimable qualities for which the early herds are noted, but are to day exhibiting proportions that astonish even the breeders of Short-Horns.

"Banister" (734) weighed at six months old 630 pounds. "Barefoot" (732) bred by the Hon. James Buckingham, Zanesville, Ohio, weighed at two years old 1,428 pounds. Betty 2d, bred by I. S. Newton, Esq., of Verona, Dane county, Wisconsin, 2,000 pounds at four years old.

The Devons do not mature quite as early as the Short-Horns, but are much more remarkable for longevity, it being not an uncommon occurrence for a cow to retain her breeding and milking qualities until over twenty years old."

Mr. William Mattoon, of Springfield, Mass., slaughtered a bull named "Springfield," several years since, the dressed weight of which was 1,179 pounds after hanging sixty hours; and also a cow whose live weight in full feed was 1,215 pounds, the dressed weight of which was 911 pounds, the shrinkage being less than twenty-five per cent. Another bull of this breed, owned by the same party, the "Duke of Hampden," when sixteen months old weighed 1,210 pounds, having gained in the seventy-five days previous 210 pounds, equivalent to two and four-fifths pounds per day. The feed given him was one quart of meal per day. When this animal was three years old, he weighed 2,030 pounds. His herd of cows, varying from four to seventeen years, weighed on an average in the autumn, 1,233 $\frac{3}{4}$  pounds each.

From the London Smithfield market reports, we glean the following facts. The Earl of Leicester's steers, on his Holkham estates, gave dead net weight, of 1,000, 1,200, and 1,400 pounds. Those of the Duke of Norfolk, in Suffolk, were from 900 to 1,000 pounds each. One is reputed to have given dead net weight of 1,593 pounds at five years and eleven months. Another that was three years and seven months old gave dead net weight of 1,316 pounds (rough tallow 160 pounds). For many localities they are better adapted than some of the heavier breeds, especially so in hilly sections and mountain ranges where grass may be short, and the pasturage scanty.

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## HEREFORDS.

**T**HE Hereford cattle derive their name from a county in the western part of England. Their first importation to the United States was made in 1816 or 1817, by Henry Clay of Kentucky, who was a great admirer and patron of fine stock. They have not, however, been imported to this country in large numbers until a comparatively recent date, although they are a valuable breed of ancient origin, and have received considerable attention in England during the last century. Herefords have not been as widely disseminated in England as the improved Short-Horns, they being found principally in some of the western counties of England, and the adjoining ones in Wales.

At present they seem to be rivals of the Short-Horns in this country, where they are acquiring increased popularity for beef, and as working oxen. Like the Short-Horns, they

are admirable grazier's cattle, and are best adapted to regions where there is a great abundance of the best pasturage, being a heavy breed, although they will thrive on coarser and less food than the Short-Horns, and are also considered by many as more hardy than the latter. When well fattened, they make most excellent beef, their bodies being compact, level, and massive, while they take on flesh very rapidly.

Professor Lowe says of them: "They have the orange-yellow color of the skin which distinguishes the *Pembrokes* and the *Devons*, and that medium length of horns which separate these breeds and their varieties from the race termed Longhorned. It cannot be supposed that they have been kept free from intermixture with the Long-horned and other varieties of the lower country, but they may be referred to that group of breeds which comprehends the *Pembroke*, the *Deron*, the *Sussex*, and the *Glamorgan*, and which some writers have proposed to term Middle-horned, a designation which distinguishes them from the Long-horned on the one hand, and the Short-horned on the other.

But whatever the character of the former cattle of Herefordshire, the breed as it now exists owes all of its reputation to modern changes. About the year 1766 the late Mr. Benjamin Tomkins began a system of breeding which ultimately exercised a great influence on the stock of this part of England. It appears that size, and adaptation to the dairy and the purpose of labor, were then the properties chiefly sought for by the breeders of Herefordshire. Mr. Tomkins, when a young man, was in the employ of an individual, afterwards his father-in-law, and had the especial charge of the dairy. Two cows had been brought to this dairy, supposed to have been purchased at the fair at Kington, on the confines of Wales. Tomkins remarked the extraordinary tendency of these animals to become fat. On his marriage he acquired these two cows, and commenced breeding from them on his own account. The one with more of white he called Pigeon, and the other, of a rich red color with a spotted face, he called Mottle; and it is remarkable that the marking of the two cows may be distinguished in their descendants at the present day. Mr. Tomkins appears to have selected good cows where he could obtain them in the district, but to have reared his bulls from his own stock, although, in the earlier stage of his improvements, he sometimes made use of other bulls when they suited his purpose. After a time, however, he abandoned the practice, and confined himself in breeding to his own stock. It thus appears that the principle of his system was selection of the most suitable individuals for breeding, and that having produced, by this means, animals of the properties required, he confined himself to his own herd. Having arrived at the improvement sought for, he communicated to the individuals, by intermixture with one another, that uniformity and permanence of character which constitute a breed."

This valuable breed of cattle is at present more numerous in the Western and Middle States—especially the former—than in the Eastern or Southern, but their great merit causes them to be highly prized wherever they have been introduced.

**Description.**—The Herefords of a century ago were described as a deep red, or brown in color, with mottled faces. Some of the best specimens of the breed were mottled or roan throughout. The improved Hereford of to-day has a white face,—sometimes, though rarely, slightly mottled,—white throat and belly, while the white usually extends from the top of the head back on the neck, and occasionally, though not commonly, continuing along the back. The remaining part of the body, except, perhaps, a portion of the legs, is generally of a dark red color, although sometimes a light red. The ears are usually red, the forehead broad; eyes bright and mild in expression, horns slender and spreading, head of medium size, though larger and not quite as clean as that of the *Devon*; chest deep; hips well developed and level with the back; hind quarters long and well rounded; buttock on a level with the back; hair soft and fine; body round and full, and well formed; in fact, their general form resembles that of the *Devon* so closely that a definite description seems unnecessary.



**TWO-YEAR-OLD HEREFORD HEIFER.**  
Property of T. L. Miller, Beecher, Ill.



Mr. Rowlandson states in the Journal of the Royal Agricultural Society of England, that the Herefords were originally brown, or a reddish-brown, and relates an incident of the first appearance of a white-faced calf of this breed in the herd of a Mr. Huntington, near Hereford. This occurred about the year 1750. The keeper of the herd came to the house of the owner one day, bearing the remarkable intelligence that the favorite cow had a white-faced bull calf. Here was something that had never been known to have occurred before, and the calf became quite a curiosity. It was agreed that the animal should be reared and used as a propagator of the breed, which was accordingly done, and the progeny became peculiarly celebrated for white faces. This probably is the origin of this characteristic of the present breed of Herefords. Aside from color and size, — they being about a fourth larger than the Devon, — their general characteristics are very similar to the latter breed. As beef producers they mature early, and are sufficiently grown for fattening at from three to four years.

**Value of Herefords for the Dairy.** — The Hereford has little merit as a dairy breed, having been bred principally with a view towards developing, as far as practicable, the fattening qualities for which they have been justly celebrated. The former general practice in their native country was to permit the calves to run with the dams from four to six months; the bull calves often eight months. Under such circumstances, it could not be expected that the milking qualities of the breed would be largely developed. With the enlightened views of breeders of the present day exemplified in practice, there is no doubt but that Herefords might in a few generations become great milk producers. In such a case, however, the breed would probably lose to a certain extent some of the fine beef points, on the same principle that the Short-Horn has gained them by a general breeding out of the milking characteristics.

That some really good milkers have been found among Hereford cows will be seen by the following, taken from the dairy records of this breed. A cow owned by a Mr. Cook in one of the Western States, is reported as making fourteen pounds of butter per week, while a Mr. Lengmore possessed one that gave twenty-two quarts of milk per day, the quantity yielding two and a half pounds of butter. A four-year old heifer is mentioned in another report as producing eight pounds of butter per week. When the Herefords are bred with special reference to dairy qualities as a general practice, there will doubtless be a great change in them in this respect.

**Beef Qualities of Herefords.** — In this capacity the Hereford is a superior animal. The beef is of fine texture, delicate flavor, well marbled or mixed, and commands a high price in the markets. These animals mature for the butcher's block at from three to four years, fatten readily, and will put on more meat and fat for the food consumed than almost any other breed, being considered by some to be superior to the Short-Horn in this respect, while their carcasses, when fully matured and fattened, are large, compact, and level. It is now comparatively but a few years since the movement was made in the West to bring forward the claims of this breed of cattle for the production of beef, and thus far it has proved very successful. They are at present competing with the Short-Horn in this country, as well as in Europe, for the palm of excellence.

The production of beef upon the plains of the Great West is no longer an experiment, but has become a leading industry, commanding the capital of the wealthy men of this country and England as well. Formerly the steers that came to our market from this source were few in number, and very inferior in quality. They were the Texan cattle, somewhat improved by a change to the better grazing region of that section. Since that period, great improvement has been effected by the infusion of new blood, crosses having been produced by the Short-Horn and other pure breeds, while the Hereford has also been tested sufficiently to prove its great value in improving these cattle. A few years since a small number of Herefords were taken to Colorado, and proved themselves admirably adapted for this pur-

pose, reproducing their like in quality and character, and enduring the change of climate and conditions most successfully. It is claimed by the advocates of this breed, that when grazing and feeding with mixed herds of cattle, the grade Herefords make larger gains than any other breed or grade of steers. It is also claimed by some, that the cross produced by the Hereford bull and Short-Horn cow will give a produce that will command a better price in the beef market than the pure Short-Horn. In point of beauty, their color might be considered an objection, a white or mottled-faced animal never being so pleasing to the eye as a uniform color; still, there are other points of merit in beef production superior to color, and when looking at the question in a practical point of view, it must be conceded that this breed justly merits a place among the first in beef production.

The illustrations of Herefords which we insert are faithful copies of some of the best types of the breed they represent, — as in fact all of the animal cuts in this work are, — and indicate their characteristics better and more completely than could be described in words.

**Herefords as Oxen.**—The Hereford ox is an excellent working animal, being large, strong, muscular, and well developed, docile, and easily matched. He is, however, less active than the Devon, owing to superior size and weight; is free, willing, and intelligent, as well as kindly in disposition.

Good oxen are also produced by crossing the Hereford Bull with the native cow, the progeny almost invariably possessing the strong characteristics of the sire, especially in form and color. When no longer useful as oxen, they can in a short time be very readily converted into first-class beef for the market.

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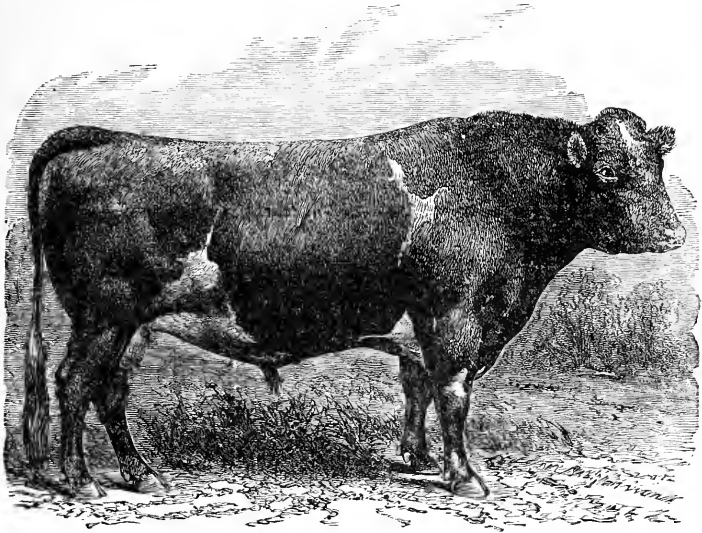
## POLLED OR HORNLESS CATTLE.

**T**HERE are several varieties of polled or hornless breeds of cattle in England, the principal of which are the Angus or Aberdeen, Galloway, and the Suffolk. According to Low, in his "Cattle of the British Islands," the Angus breed originated more than a century ago, in the north of Scotland, and are now considerably scattered throughout the grazing region of Great Britain. They have been greatly improved, by careful breeding within the last quarter of a century, and with the Galloways are highly esteemed as beef-cattle in the English markets, the meat furnished by them being of excellent quality, while their carcasses have proportionately a small amount of waste. The Galloways derive their name from the county in which they originated, and have within a few years past been imported into this country and bred to a limited extent, being frequently seen at fairs. They are hardy animals, good feeders, admirably adapted to hilly districts, and are more properly classed with the beef than dairy breeds, being noted more especially for the production of a superior quality of beef, than for fine milking qualities. These cattle are valuable in producing a cross with other breeds. The grade produced in crossing them with the Short Horn Bull has been found to combine in a great degree the good qualities of both parents. Wherever the milking qualities of the Angus breed have received due attention in breeding the result has been very satisfactory in this direction, as will be seen by the following from the North British Agriculturist, written by the Earl of Airlie—and the same will doubtless prove true with respect to the Galloways:

"I have at present seventeen pure Polled Angus milch cows in my dairy. The greatest number of these give from twelve to fourteen, and sometimes sixteen Scotch pints for a considerable time after calving. The milk is admitted to be much richer than that of either the Short-Horn or the Ayrshire. As regards the length of time for which they will continue to

give milk, my cow Belle of Airlie (1.959), dam of Belus (749), as pure a Polled animal as any in the herd book, used to be milked all the year round. Last year, when I was from home, they left off milking her about a month before she calved, and she died of milk fever, induced, as I believe, by the circumstance that she had not been relieved of her superabundant milk. The cow Miss M'Pherson (1.252) of the Erica tribe, which I purchased recently of Mr. Adamson, is now giving six Scotch pints a day, more than nine and a half months after calving. The dairy cows referred to were selected by me with a view to their milking qualities; and whenever I found the produce turn out bad milkers, I drafted and fed them for the butcher, except in a few instances, when, from their shapes and blood, I thought them likely to produce a valuable tribe of cattle."

The *Suffolk* breed, known also as the *Suffolk Dun* and *Norfolk*, are descended from the *Galloways*, but differ from them very materially. They were formerly celebrated for their large production of milk, and at present combine the two qualities of milk and beef production, although in the latter respect they are regarded as not quite equal to the other polled or hornless breeds.



JAMESTOWN BULL "ST. PATRICK."

Weight 1,600 lbs. Owned by A. W. Cheever, "Pine Hedge" Farm, Sheldonville, Mass.

The dun color was the prevailing one with this breed a half-century or more ago, but is now rarely seen, being rejected as an almost sure indication of inferior qualities. They are mostly now of a reddish brown, or deep red, and are less heavy in the neck and shoulders than the *Galloways*. They are very hardy, docile, and good feeders.

Mr. A. W. Cheever, editor of the "*New England Farmer*," and breeder of a family of polled cattle known as the "*Jamestowns*," of which we give an illustration, says of them :

"These polled cattle bear the local name of "*Jamestowns*," and are so highly esteemed in the vicinity, that the *Norfolk Agricultural Society* has authorized committees to award

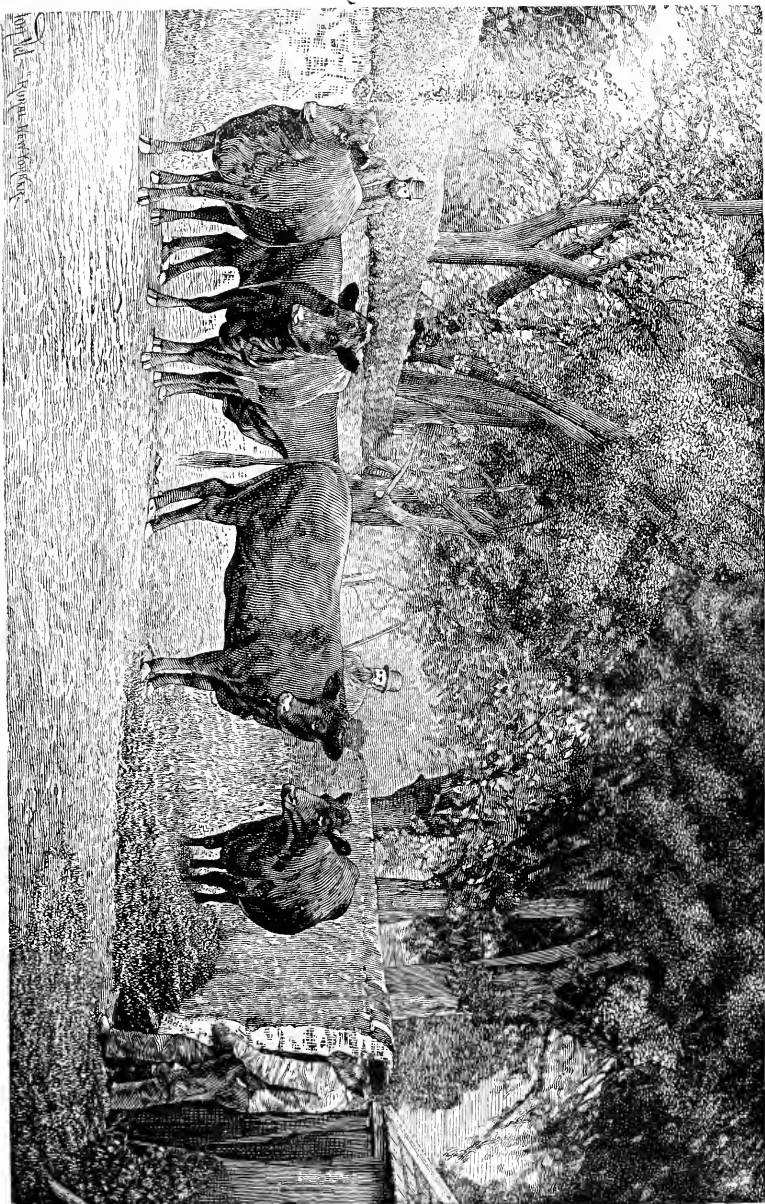
prizes to them as a distinct breed, although they are hardly yet entitled to the name of pure-breeds, as they have frequently been crossed with the Jersey and Ayrshire stock. The origin of the "Jamestowns," as near I can learn, is as follows: In 1847, Captain R. B. Forbes went to Ireland as commander of the U. S. ship *Jamestown*, with a cargo of provisions for the people who were suffering from the famine due to the failure of the potato crop. On his return the Lord Lieutenant of Ireland, wishing to confer a favor upon the commander, made him a present of a "Suffolk" heifer, which proved to be a remarkably deep milker, giving in her flow twenty-six quarts, beer measure, of the richest milk. Captain Forbes sold the heifer to John Marland, of Andover, Mass., giving the proceeds to the Irish charity fund, and she was afterwards owned by John D. Bates, of Swampscott, and by a Mr. Osborne, of Danvers. She had few heifer calves, and one owned by Wallace Thaxter, of Boston, proved a superior dairy cow. Several of her bull calves were raised, and left their impress upon the dairy stock in the vicinity of Boston. In 1854 this cow dropped a bull calf which was secured by the late Dr. Eben Wight, of Dedham, and named "*Jamestown*" after the noble ship that brought his mother to this country. He proved himself as remarkable in his progeny as that of his kind on his mother's side. His sire was "Beverly," a thoroughbred Jersey, out of "Flora," by the "First Prize Bull" at the Royal Agricultural Show in Jersey. "Flora" was imported by Mr. Thomas Motley, and proved a leading representative of that popular dairy stock, having made sixteen pounds of butter per week.

The "*Jamestowns*" are noted for their gentleness. When the bull "*Jamestown*" was five years old, a boy of the same age could manage him with safety. The animals are very hardy, are hearty feeders, and hold out in their milk, often through the entire year. My own herd has been bred with more regard for quality than quantity of milk, and for several years past has averaged 200 to 250 pounds of butter per cow. In extra favorable seasons, the quantity has exceeded the above amount. As dairy cows, I presume the "*Jamestowns*" may be excelled by the best families of pure Jerseys, but their large size, their ease of fattening when dry, together with their excellent dispositions, make them the most desirable dairy animals, in my estimation, that I have ever met. I can put my whole herd into a yard so small that they can hardly turn around, and yet feel perfectly free from anxiety or fear of injury to the animals. The bull I am now keeping, though past three years old, has never worn a ring, is tied in the stall with cows, and is as easily and safely handled as a six week's calf."

**Description of Galloways.**—The Galloway is a very compact, well proportioned animal, as will be seen by the following description of the breed by Youatt:—

"The Galloway cattle are straight and broad in the back, and nearly level from the head to the rump. They are round in the ribs, and also between the shoulders and the ribs, and the ribs and the loins. They are broad in the loin, without any large projecting hook bones. In roundness of barrel, and fullness of ribs, they will compare with any breed, and also in the proportion which the loins bear to the hook bones, or protuberances of the ribs. The Rev. Mr. Smith, the author of the *Survey of Galloway*, says that 'when viewed from above, the whole body appears beautifully rounded, like the longitudinal section of a roller.' They are long in the quarters and ribs, and deep in the chest, but not broad in the twist. The slightest inspection will show that there is less space between the hook or hip bones and the ribs, than in most other breeds, a consideration of much importance, for the advantage of length of carcass consists in the animal being well ribbed home, or as little as possible lost in the flank.

They are short in the leg, and moderately fine in the shank bones,—the happy medium seems to be preserved in the leg, which secures hardihood and a disposition to fatten. With the same cleanness and shortness of shank, there is no breed so large and muscular above



# GROUP OF IMPORTED POLLED ANGUS COWS.

Property of Burleigh & Bodwell, Lang Farm, Vassalboro', Me.

[Copied by permission from *Rural New Yorker*.]



the knee, while there is more room for the deep, broad, and capacious chest. He is clean, not fine and slender, but well proportioned in the neck and chaps; a thin and delicate neck would not correspond with the broad shoulders, deep chest, and close, compact form of the breed. The neck of the Galloway bull is thick, almost to a fault. The head is rather heavy; the eyes are not prominent, and the ears are large, rough, and full of long hairs on the inside.

The Galloway is covered with a loose, mellow skin of medium thickness, and which is clothed with long, soft, silky hair. The skin is thinner than that of the Leicestershire, but not as fine as the hide of the improved Durham breed, yet it handles soft and kindly. Even on the moorland farms, where the cattle during the greater part of the year are fed on the scantiest fare, it is remarkable how little their hides indicate the privations they endure. The prevailing and fashionable color is black,—a few are of a dark brindled brown, and still fewer are speckled with white spots, and some of them are of a dun or drab color, perhaps acquired from a cross with the Suffolk breed of cattle. Dark colors are uniformly preferred, from the belief that they indicate hardiness of constitution." Another eminent authority, Mr. Culley, says of them: "In most respects, except wanting horns, these cattle resemble the Long-Horns, both in color and shape, only they are shorter in their form, which probably makes them weigh less. Their hides seem to be a medium between the Long and Short-Horns, not so thick as the former, nor so thin as the latter, and like the best feeding kind of Short-Horns, they lay their fat upon the most valuable parts, and their beef is well marbled or mixed with fat. They are mostly bred upon the moors or hilly country of Galloway, until rising four or five years old, when they are taken to the fairs in Norfolk and Suffolk, previous to the turnip feeding season, whence the greater part of them are removed in the winter and spring (when fat) to supply the consumption of the capital, where they are readily sold, and at high prices, for few or no cattle sell so high in Smithfield market, owing to their laying their fat in the most valuable parts, and it is no unusual thing to see one of these little bullocks outsell a coarse Lincolnshire bullock, although the latter is heavier by several stones."

A century ago the Galloways frequently had small horns, but they are now characterized as entirely hornless, except rarely one may be found hanging loose on the skin, with no development of bone from the skull to attach them to the latter.

## LONG-HORNS.

**T**HESE cattle formerly had some influence on American stock, but have not been bred to any extent as a distinct breed in this country; neither could the improved Long-Horn be recommended to compete with the popular breeds that have been imported, and are at present used to improve our native stock, although they are not without some valuable characteristics. When compared with superior breeds they cannot in any sense be regarded as rivals, and the application of the natural law of "the survival of the fittest" would condemn them to extinction as a race.

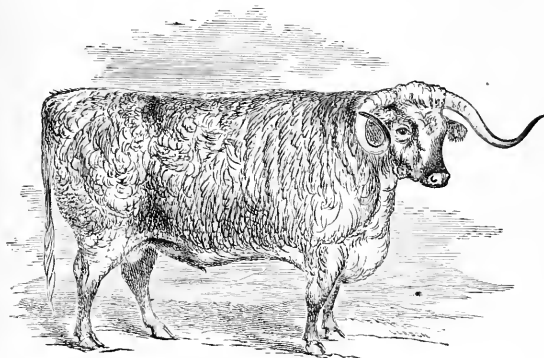
This breed had its origin in Great Britain, but from what direct source is unknown. Youatt says of them: "In the district of Craven, a fertile corner of the West Riding of Yorkshire, bordering on Lancashire, and separated from Westmoreland chiefly by the western moorlands, there has been, from the earliest records of British Agriculture, a peculiar breed of cattle. They were distinguished from the home-breds of other counties by a disproportionate and frequently unbecoming length of horn. In the old breed, this horn frequently projected nearly horizontal on either side, but as the cattle were improved, the

horn assumed other directions; it hung down so that the animal could scarcely graze, or it curved so as to threaten to meet before the muzzle, and so also to prevent the beast from grazing; or immediately under the jaw, and so to lock the lower jaw; or the points presented themselves against the bones of the nose and face, threatening to perforate them.

In proportion as the breed became improved, the horns lengthened, and they are characteristically distinguished by the name of 'The Long-Horns.' Cattle of similar description were found in the districts of Lancashire, bordering on Craven, and also in the Southeastern parts of Westmoreland; but *tradition*, in both of these districts, pointed to Craven as the original habitation of the Long-Horn breed. If there gradually arose any difference between them, it was that the Craven beasts were the broadest in the chine, the shortest, the hand-

somest, and the quickest feeders; the Lancashire ones were larger, longer in the quarters, but with a fall behind the shoulders, and not so level on the chine. Whence these cattle were derived, is still a disputed point."

They were formerly a coarse, loose-jointed animal, characterized by great length of horns, thick, firm skin, long, compact hair, coarse, leathery thickness of the neck, and large hoofs. The improved Long-Horn, as previously stated, is an



LONG-HORN OX.

animal possessing some very good points, and is still used in the dairy in portions of England, although not to any great extent.

## HIGHLAND CATTLE.

**T**HIS breed of cattle are widely scattered over the Highlands of Scotland, but are said to be found in the greatest perfection in the larger Hebrides. A prominent English writer says of them, "Well bred oxen of this breed, when of mature growth, and in good condition, exhibit a symmetry of form and noble bearing unequalled by any cattle in the kingdom. Although somewhat slow in arriving at maturity, they are contented with the coarsest fare, and ultimately get fat where the daintier Short-Horns could barely exist. Their hardy constitution, thick, mellow hide and shaggy coat, peculiarly adapt them for a cold, humid climate and coarse pasture. The milk of the cow is very rich, but as they yield it in small quantities, and soon get dry, they are unsuited for the dairy, and are kept solely for the purpose of suckling each her own calf.

Of these cattle, those of a dun or tawny color are often selected for grazing on the parks of the aristocracy, where they look quite as picturesque as the deer with which they

are associated, resembling, as they do, the so-called wild cattle that are carefully preserved in the parks of the nobility, and like them are probably the descendants of the cattle of the ancient Britons."

**Description.**—The true Kyloe or West Highland cattle are described as follows, by an extensive breeder of them,—Mr. Malcolm McNeill, of the Isle of Irlay, one of the Southern Hebrides :

"The Highland bull should be black, the head not large, the ears thin, the muzzle fine, and rather turned up. He should be broad in the face, the eyes prominent, and the countenance calm and placid. The horns should taper finely to a point; and, neither drooping too much, nor rising too high, should be of a waxy color, and widely set on at the root. The neck should be fine, particularly where it joins the head, and rising with a gentle curve from the shoulder. The breast (*brisket*) wide, and projecting well before the legs. The shoulder broad at the top, and the chune so full as to leave little hollow behind them (that is, the *crops* are *full*). The girth behind the shoulder deep; the back straight, wide, and flat; the ribs broad, the space between them and the hips small; the belly not sinking low in the middle; yet, in the whole, not forming the round and barrel-like carcass which some have described. The thigh tapering to the hock-joint; the bones larger in proportion to the size than in the breeds of the southern districts. The tail set on a level with the back. The legs short and straight. The whole carcass covered with a thick, long coat of hair, and plenty of hair also about the face and horns, and the hair not curly."

These cattle are principally valuable for the production of a fine quality of beef. In fact their beef is regarded in the English market as superior to all others, being tender, juicy, nicely marbled, and of delicate flavor. They are small animals, but fatten readily. The weight of a carcass of the bullock will range from 600 to 800 pounds.

These animals are not found in this country, but we do not doubt that they would prove profitable in certain sections, such as mountain districts, where the pasturage is scanty and coarse, and where the more delicate and heavier breeds could scarcely be maintained.

**Dairy Breeds.**—Although nearly all breeds of cattle are used to a certain extent in the dairy, there are some that are much better adapted to the purpose than others, and are bred with special reference to it. The breeds that are the most highly prized for quantity and richness of milk production are generally characterized by less flesh and fat, and are also of smaller size than those commonly designated graziers' cattle, or the beef breeds; although there are some exceptions, such as the Highland cattle, for instance, that are of small size, and are especially noted for their fine quality of beef. It is in fact generally known, that the cow, in its natural or wild state, yields only a sufficient quantity of milk to sustain her offspring for a few weeks, and until it can derive sustenance from other food. She therefore, under such conditions, produces milk but a small portion of the year, and it is only by judicious treatment for many generations that this tendency to revert to that condition has been in a measure obviated.

By care and selection in breeding, as well as in management with reference to the development of special characteristics, some breeds have the dairy qualities more fully developed than others, and these have been transmitted from one generation to another. Different breeds, as well as individuals of the same breeds, will also be found to differ more or less from each other, with regard to the quality and quantity of milk produced. Dairy stock should therefore be selected with reference to the special purpose to which the milk produced is to be appropriated, whether it be for milk, for use as such, or for the manufacture of butter or cheese.

It will be found generally that the large milkers and larger dairy breeds are the most desirable for the cheese dairy or factory, while the smaller milkers, and smaller breeds, yielding a richer milk, will prove most profitable for the butter dairy and creamery.

The Jerseys or Alderneys, Guernseys and Swiss are justly celebrated for the production of butter, while the Ayrshire, Dutch Friesian or Holstein breeds,—especially the latter,—are noted for large yields of milk, and are admirably adapted for use in the cheese dairy. Other breeds such as the Devons, Short-Horns, etc., often furnish cows of exceptionally fine dairy characteristics, while individuals among the native stock will not unfrequently be found that will give astonishingly large yields of rich milk. The pure breeds are however more reliable, and can be depended upon with greater certainty in transmitting their good qualities than grades, but when the farmer does not feel able to procure the pure breeds, he should grade up, using the best of his native or common stock as the basis.

**Classes of Dairy Cows.**—It will be seen by what has been said with reference to dairy breeds, that this stock may be divided into three classes, or distinct branches, viz.: cows that are best adapted to the butter dairy or creamery, where the manufacture of butter of the best quality is the principal object; cows that are adapted to the manufacture of cheese or the production of large quantities of milk, and those that are especially adapted for family use. For the first, a cow that produces milk of a very rich quality should be selected; milk in which the butter particles readily separate from the water and rise in the form of thick, yellow cream on the surface. Here quality is of the first importance in the milk, and quantity secondary. The milk of some cows possesses more than twice the amount of butter element than others, while the color of the cream and butter will vary in a corresponding degree. As a butter dairy, or creamery cow, we have good examples in the Jersey, or Guernsey breed.

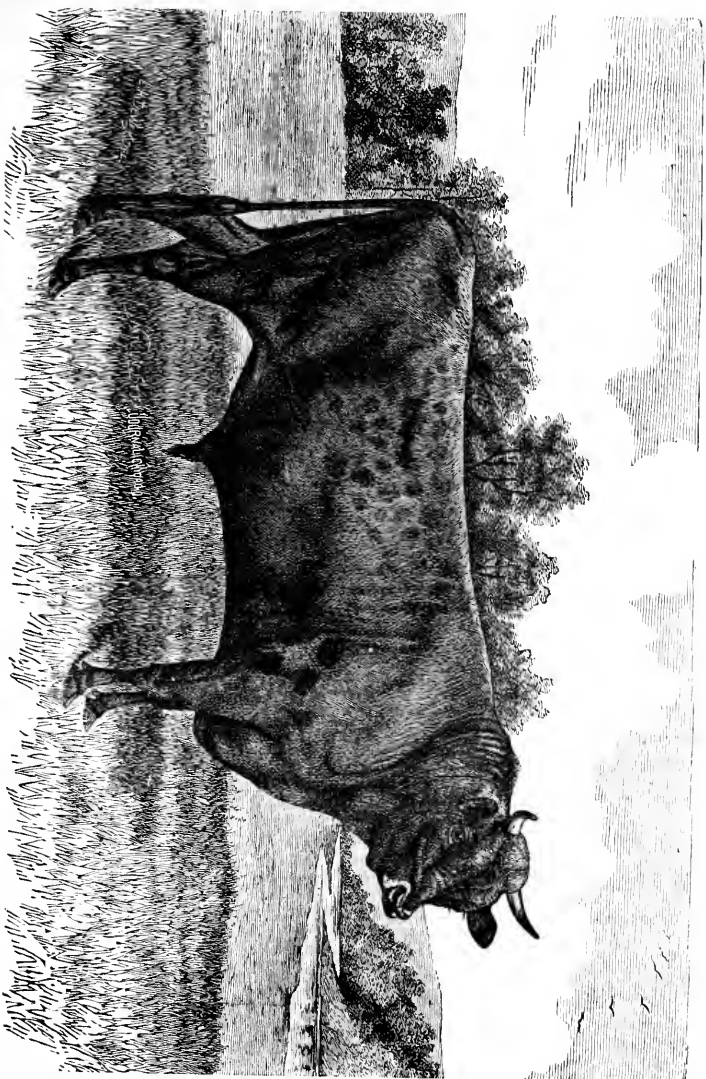
For the cheese or milk dairy, the object is generally to secure the largest quantity of milk, with less reference to the quality than in the former class. Consequently the cows best adapted for those whose business it is to supply milk to families in large quantities at ordinary rates, the cheese factory, or for the manufacture of cheese in the farm dairy, are the large milkers, of which the Dutch and Ayrshires furnish good examples. These breeds also furnish butter of very good quality, and in large quantity, but are not characterized as being as remarkable in this respect as the Jersey or Alderney, Guernsey and Swiss breeds.

For family use, if rich milk and cream for the table is desired, and a docile animal that loves to be petted by members of the household is wanted, we know of none better adapted to the purpose than the Jersey or Guernsey cow. If a larger quantity of milk is required, irrespective of quality, then some of the larger milk-yielding breeds will admirably subserve the purpose.

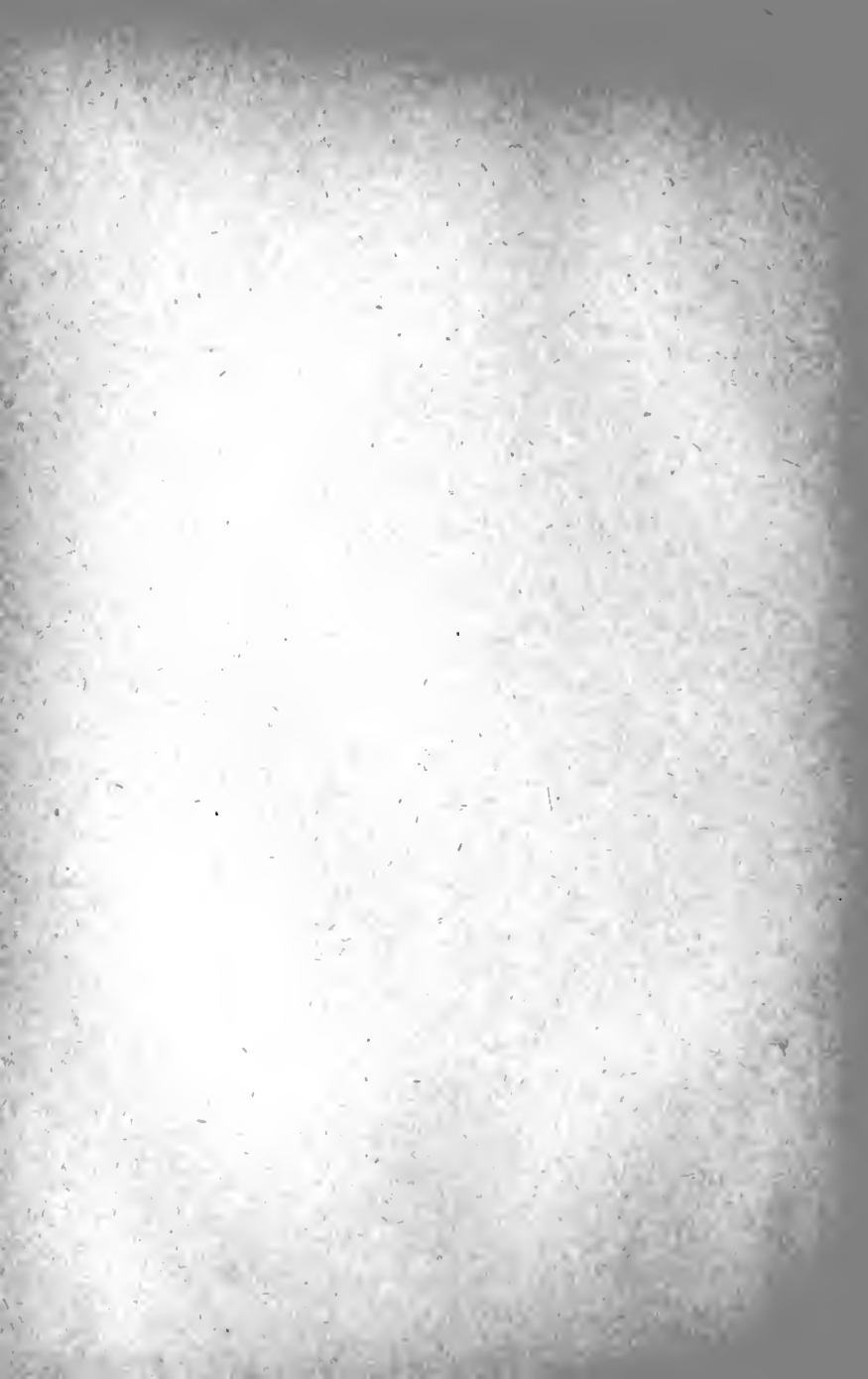
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## JERSEYS.

THE Channel Islands have long been celebrated for cattle of superior value in the production of milk rich in butter properties, it being of extraordinary quality, and yielding a greater proportion of cream and butter than can be obtained from that of any other breed. These islands, as is well known, are four in number, Alderney, Jersey, Guernsey, and Sark, lying near the coast of France, and have been described as resembling "bits of France that have drifted out to sea." The breeds of cattle of these several islands are similar, although the Guernsey differs more from the common type, and resembles in many respects the Normandy races, while the Alderney closely resembles certain of the Norway breeds. The largest of this Channel Island group is Jersey, it being about twelve miles in length and five in breadth. From here the largest numbers of these cattle have been thus far imported to the United States; hence, this breed are now more generally known in this country by the name of "Jersey," although in Britain they are commonly called "Alderney."



IMPORTED JERSEY BULL, "LE BROCC'S PRIZE."  
Property of Churchman & Jackson, "Beech Grove Farm," Indianapolis, Ind.



These cattle were imported into this country more than fifty years ago, but not in considerable numbers until during the last twenty-five years, during which time they have grown rapidly in popular favor, and have now become quite common in all the New England States, New York, New Jersey, Pennsylvania, and Maryland, and a few other states farther south and west. It is stated that in 1789, the Jersey breed was considered so much superior to any other breed then known, that an act was passed by the local legislature prohibiting the importation of any foreign breed into the island, under a penalty of two hundred livres, to which was also added the forfeiture of the boat and its tackle, and a fine of fifty livres upon every sailor on board who failed to give information of such cattle being landed. The animals landed were also doomed to immediate slaughter and their flesh given to the poor, and to the present time no foreign cattle are permitted to be landed on the island, except as butcher's meat. By such means the purity of the Jersey blood has been maintained. They are natives of a milder climate than our Northern States, and are therefore not quite as hardy as some of our other breeds, and will not thrive under neglect. They should always be provided (as indeed all cattle should,) with a plenty of good food, and also with warm shelter in cold or stormy weather, and they will abundantly repay all the care bestowed upon them. They are pre-eminently a dairy breed, being too small to be profitable for beef, while their size and consequent want of strength renders them ill-adapted for working oxen, although Low states that in their native country the bullocks are used for labor.

In England, as in this country, aside from dairy use, Jerseys are much in demand by gentlemen of means residing in the neighborhood of cities, for the purpose of furnishing rich milk and cream for their tables. In such cases they are permitted to graze their lawns, and are carefully tended and petted.

**Description of Jerseys.**— With respect to the general appearance and characteristics of the Jersey or Alderney breed, Low says: "The cattle of this race are small and ill-formed when regarded as animals to fatten. The neck of the cow thin; her shoulder light; her chest narrow; her belly large. The limbs are slender; the pelvic bones are prominent; the lumbar region is deep; the croup short and drooping, and udder large. The muzzle is narrow; the horns are short, slender, and curving inwards. The color is usually of a light red or fawn, mixed with white; but frequently individuals are black, mixed white, or dun, and sometimes cream-colored. The skin is thin, and of a rich, orange-yellow, and the fat is tinged with the same color. The animals are gentle, and somewhat delicate in constitution. Being small, the milk they yield is likewise small in quantity — although fully in proportion to their bulk of body — and it is viscid and rich in cream. In their native country, the bullocks are used for labor, to which they are better adapted than, from the slender form of the dam, might be inferred."

Mr. L. F. Allen describes the breed more definitely, as follows: "Beginning with the head — the most characteristic feature — the muzzle is fine; the nose either dark-brown or black, and occasionally a yellowish shade, with a peculiar mealy, light-colored hair, running up the face into a smoky hue, when it gradually takes the general color of the body; the face is slightly dishing, clean of flesh, mild and gentle in expression; the eye clear and full, and encircled with a distinct ring of the color of the nose; the forehead bold; the horn short, curving inward, and waxy in color, with black tips; the ear sizable, thin, and quick in movement. The whole head is original, and blood-like in appearance, — more so than in almost any other of the cattle race, — reminding one strongly of the head of our American elk. The neck is somewhat depressed — would be called ewe-necked by some — but clean in the throat, with moderate or little dewlap; the shoulders are wide and somewhat ragged, with prominent points, running down to a delicate arm, and slender legs beneath; the fore-quarters stand rather close together, with a thinnish, yet well-developed brisket between; the ribs are flat, yet giving sufficient play for good lungs; the back depressed and somewhat hollow; the belly

deep and large; the hips tolerably wide; the rump and tail high; the loin and quarter medium in length; the thigh thin and deep; the twist wide, to accommodate a clean, good-sized udder; the flanks medium; the hocks or gambrel joints crooked; the hind legs small; the udder capacious, square, set well forward, and covered with soft, silky hair; the teats fine, standing well apart, and nicely tapering; the milk veins prominent.

On the whole, she is a homely, blood-like, gentle, useful little housekeeping body, with a most kindly temper, loving to be petted, and like the pony with the children, readily becomes a great favorite with those who have her about them, either in pasture, paddock, stable, or the lawn. The colors are usually light-red or fawn, occasionally smoky-gray, and sometimes black, mixed or splashed more or less with white. Roan colors, and a more rounded form, are now and then seen among them, but we do not like them (as they savor of a Short-Horn cross, which they should not have), as anything but their own blood and figure, and that of the ancient stock, deteriorates them — as Alderneys."

An extensive breeder of Jerseys in Massachusetts says with respect to size and color in this breed: "We prefer the Jersey cow of medium size, large as may be *without coarseness*. Symmetry and uniform shape and color are always strong and valuable points in families and strains of Jersey cattle, indicative of good breeding.

The color of Jerseys is a mere matter of fancy — having no influence with their dairy qualifications. Breeders have their fancy for light fawns with white, solid fawns, light and dark, black and light tongues, etc. We are not wedded to any color, although we admit that it often has a marked influence on the prices of Jerseys.

Having bred sixty-seven animals, the progeny and descendants of one cow, and having solid and partly-colored animals in nearly equal number, raised and kept under like conditions, we can discern no difference in their milk product, which would be in the slightest degree influenced by color."

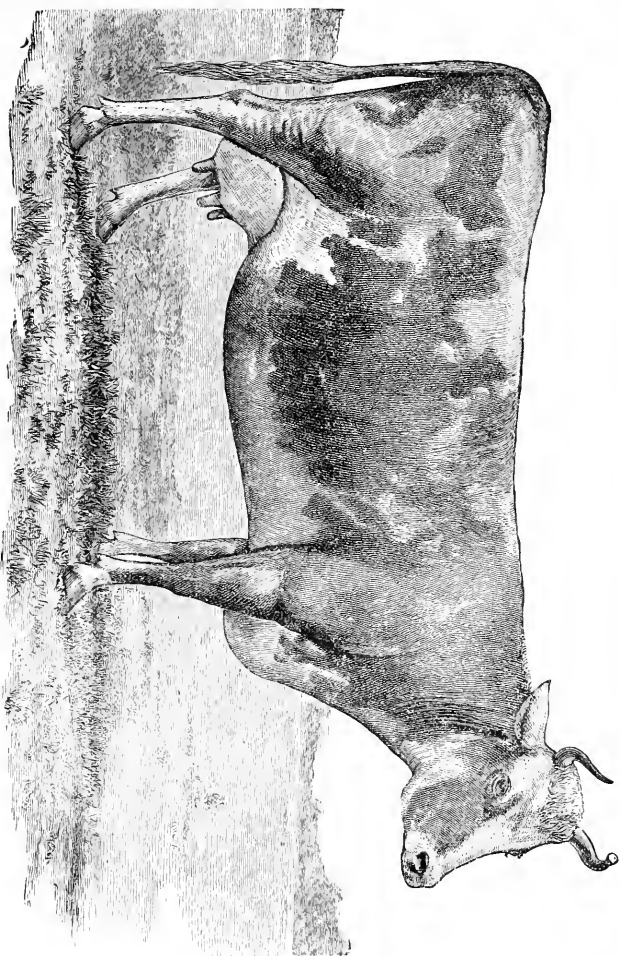
The first importations were only about one-half the size of the native cattle, and did not gain the favor of the farmers of that day, but as their real merits have become known they have been better appreciated, and at present they are generally acknowledged to be worthy the first rank as butter-dairy animals. They have also become gradually better adapted to our climate, — Americanized as it were, — and the Jersey cattle of to-day are in many respects of different type from their ancestors at the time of the first importation of this breed to our country. Their size now approaches nearer to that of the native cattle, while they have become more hardy, owing to the different conditions to which they have been subjected, climatic changes, different food, and the manner of obtaining it, etc., all of which have had a tendency to produce physical changes which may be regarded as an improvement without deteriorating their value as milk producers.

**Scale of Points for Jersey Cows.** — The following scale of points adopted by the American Jersey Cattle Club will be found of interest and value to breeders and purchasers of this stock generally, as well as those of other dairy breeds, since it gives prominence to those points from which dairy profit is to be derived, and places secondary the breeding for beauty and symmetry of form, although the latter is not entirely overlooked:

#### SCALE OF POINTS FOR JERSEY COWS.

Adopted by the American Jersey Cattle Club.

| POINTS.  | COUNTS. |
|--|---------|
| 1. Head small, lean, and rather long, . . . . .                                | 2       |
| 2. Face dished, broad between the eyes and narrow between the horns, . . . . . | 1       |
| 3. Muzzle dark, and encircled by a light color, . . . . .                      | 1       |
| 4. Eyes full and placid, . . . . .   | 1       |
| 5. Horns small, crumpled, and amber color, . . . . .                           | 3       |
| 6. Ears small and thin, . . . . .  | 1       |



**"JERSEY QUEEN OF BARNET."**

Property of A. B. Darling, New York City. Formerly owned by J. S. Kenerson, Barnet, Vt.

This cow produced from May 20, 1881, to May 20, 1882, 12,854 lbs. 6 oz. of milk, from which 851 lbs. 1 oz. of butter were made.



|     |  |   |
|-----|--|---|
| 7.  | Neck straight, thin, rather long, with clean throat and not heavy at the shoulders, . . . . .        | 4 |
| 8.  | Shoulders sloping and lean; withers thin; breast neither deficient nor beefy, . . . . .              | 3 |
| 9.  | Back level to the setting on of tail, and broad across the loin, . . . . .                           | 4 |
| 10. | Barrel hooped, broad and deep at the flank, . . . . .  | 8 |
| 11. | Hips wide apart and fine in the bone; rump long and broad, . . . . .                                 | 4 |
| 12. | Thighs long, thin, and wide apart; with legs standing square, and not to cross in walking, . . . . . | 4 |
| 13. | Legs short, small below the knees, with small hoofs, . . . . .                                       | 3 |
| 14. | Tail fine, reaching the hocks, with good switch, . . . . .   | 3 |
| 15. | Hide thin and mellow, with fine, soft hair, . . . . .  | 4 |
| 16. | Color of hide when the hair is white, on udder and inside of ears, yellow, . . . . .                 | 5 |
| 17. | Fore udder full in form, and running well forward, . . . . .   | 8 |
| 18. | Hind udder full in form, and well up behind, . . . . .   | 8 |
| 19. | Under udder free from long hair, and not fleshy, . . . . .   | 5 |
| 20. | Teats rather large, wide apart, and squarely placed, . . . . .                                       | 6 |
| 21. | Milk veins prominent, . . . . .  | 5 |
| 22. | Escutcheon high and broad, and full on thighs, . . . . .   | 8 |
| 23. | Disposition quiet and good-natured, . . . . .  | 3 |
| 24. | General appearance, rather bony than fleshy, . . . . .   | 6 |

Perfection, . . . . . 100

In judging heifers, omit Nos. 17, 18, and 21.

The same Scale of Points shall be used in judging bulls, omitting Nos. 17, 18, 19, and 21, and making due allowance for masculinity.

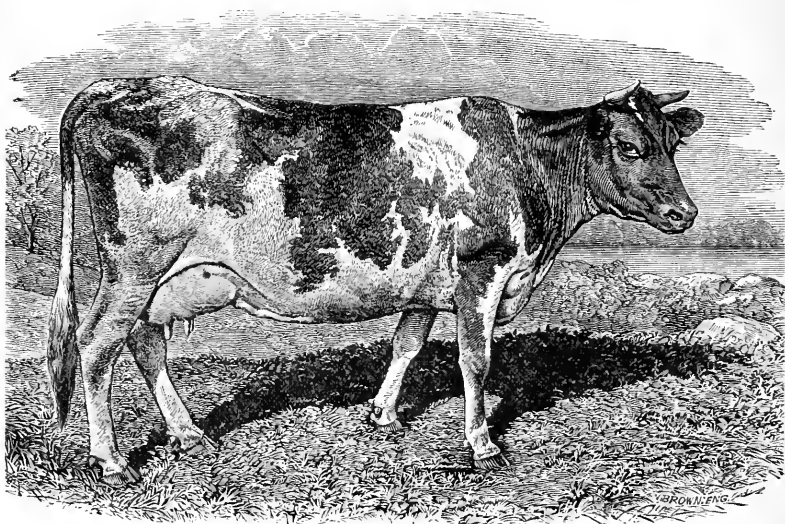
It is also recommended in the same connection that judges at fairs do not award prizes to animals falling below the following *minimum* standard, viz.: cows, 70 counts; heifers, 55 counts; bulls, 50 counts.

**Testing Jersey Cows.**—The milk of the Jersey cow is extremely rich, and of a yellow color, furnishing a remarkably large proportion of cream and butter. So superior is their milk in quality, that even two or three good cows of this breed will materially change the quality of the cream and butter in a herd of eighteen or twenty cows. While the Jersey generally produces less milk in quantity than some of the larger breeds, yet its exceeding richness more than makes up for the difference in this respect. But with reference to the latter, it must be remembered that the size of the animal should be taken into account, and that in proportion to its size, and quantity of food consumed, the Jersey also gives a fair quantity of milk.

In order to show what has been accomplished with this breed in the production of milk and butter, we give a few statements, some of which have been furnished especially for this work at our request. It is to be regretted that in such tests, the statement has not in all cases been furnished respecting the amount and kind of food given during the time in which the milk and butter records were made, as the amount and quality of food would of course materially affect the secretion of milk. But since the object of giving the result of the tests is not to determine the respective merits of individuals of this breed, but rather to show its value in the production of milk rich in butter qualities, the records are sufficiently definite for the latter purpose.

**Jersey Queen of Barnet.**—The following milk and butter record of this noted animal, as furnished us by her present owner, Mr. A. B. Darling, of New York, is for one year, beginning May 20, 1881, and ending May 20, 1882, the amount of milk produced during that time being 12,854 lbs., 6 oz., and of butter the enormous quantity of 851 lbs., 1 oz.

|                  |                              | MILK.  |     | BUTTER. |     |
|------------------|------------------------------|--------|-----|---------|-----|
|                  |                              | lbs.   | oz. | lbs.    | oz. |
| 1881.            | May 20, to June 1, . . . . . | 485    |     | 20      | 7½  |
| "                | June, . . . . .              | 1396   | 1   | 80      | 6½  |
| "                | July, . . . . .              | 1401   |     | 84      | 5   |
| "                | August, . . . . .            | 1278   | 12  | 76      | ½   |
| "                | September, . . . . .         | 1116   |     | 72      | 2   |
| "                | October, . . . . .           | 1148   | 8   | 73      | 4   |
| "                | November, . . . . .          | 1090   |     | 74      | 11  |
| "                | December, . . . . .          | 1057   | 1   | 74      | 1½  |
| 1882.            | January, . . . . .           | 975    | 12  | 75      |     |
| "                | February, . . . . .          | 684    | 12  | 55      | 3   |
| "                | March, . . . . .             | 864    |     | 66      | 11  |
| "                | April, . . . . .             | 846    | 4   | 61      | 4   |
| "                | May 1 to May 20, . . . . .   | 511    | 4   | 37      | 9   |
| Total, . . . . . |                              | 12,854 | 6   | 851     | 1   |



BELLE OF SCITUATE.

Formerly owned by Mr. Charles O. Ellms, of Scituate, Mass.

**Belle of Scituate, etc.**—Mr. Ellms, the former owner of this noted cow, gives the following history of her:

"About twelve years ago I had some twenty-two head of Jerseys, all of which made light-colored butter in winter. While at church, my mother met a lady, who, in conversation at noontime, in speaking of butter-making, said that one of their cows had made eleven pounds of as yellow butter as she had ever seen. This was in February. I requested my brother, who lived near, to secure me a calf from that cow, as I was anxious to make yellow butter in winter. My brother spoke to them as the calving time approached, and they got the consent of the owner. The cow dropped a heifer, which we brought up and named

Jersey Belle of Scituate. As the time approached for her first calf, one of our selectmen was in the barn one day, and, looking at her, exclaimed, 'Have you ever examined this heifer? She is all swollen under her belly, clear to her shoulder, with an enormous bag!'

At the time of dropping her calf, we had another cow in milk, and mixed it with that of the heifer. From the two we made 604 pounds of butter that year. We often remarked that the heifer must be a great butter animal. The next year we kept her milk separate, and found out her butter quality. When six years old her udder measured five feet one inch around. In after years it was larger, measuring on the level five feet three inches. Her escutcheon was eighteen inches in width.

On March 5th, 1877, she made three pounds six ounces of butter, and in the week following, twenty-one pounds five ounces, and for the year ending March 5th, 1878, 705 pounds of butter." Her greatest weekly yield the following year was twenty-two pounds thirteen ounces. In the year 1880 she made her greatest weekly record. Her calf was dropped June 7th, and from the 15th to the 21st of June inclusive, seven days, she made twenty-five pounds three ounces of butter. She was giving forty-five pounds of milk daily at the commencement of the test, and forty-four pounds a day at the close of the week. The butter from the first four days (one churning) was fourteen pounds eight ounces, and the next three days ten pounds eleven ounces.

In the color of her butter she was as remarkable as in yield. In winter, as in summer, it was of the same golden hue, so rich that the best judges found great difficulty in believing it was not artificially colored, until they saw the cream."

Another writer mentions the "Howard" cow, seven years old,—a cross by a Jersey bull and Short-Horn cow,—and says: "The test began April 1, 1878, when the cow ran with the herd in a field, and had but moderate feed. During the month she gave 1360 pounds of milk. May 1st she was put in good pasture, and was soon giving 52 to 54½ pounds per day. She gave 1536 pounds of milk the last seven days of the month, which made 18¾ pounds of butter, with nothing but grass for food. The cow is a roan but shows the Jersey markings about her head. Carries no flesh when in milk."

**Eurotas, etc.**—The Jersey cow "*Eurotas*," also has a remarkable record of butter yield, which in nine months and six days amounted to 706 lbs. and 3 oz. This cow was fed three pints of corn meal night and morning, and on very hot days was stabled during the middle portion of the day, and given a good supply of green corn fodder. Before the time of pasturage, in the spring, she was fed thin gruel twice a day, but received no dry grain. Of course, in addition, she had all the good hay she wanted to eat.

Mr. H. E. Alvord speaks of the Oaks cow, that made 513 lbs. of butter in nine months, as tested by the Massachusetts State Society, also the Scott cow, a native of Vermont, that made 504 lbs. of butter,—ranging from 16 to 19 lbs. per week for the first two months, and of a grade cow in New Jersey that made 21 lbs. in one week. He says:

"I have myself had several cows, five quarts of whose milk made a pound of butter; one of which, on repeated trials, gave a pound of butter for every gallon of milk. Less than a month ago, a friend showed me three pounds of beautiful butter, good weight, made from twelve and a half quarts of milk—the product of a cow for one day—and there was no reason to doubt the statement. Last March I lost a Jersey, in no sense a fancy or fashionable animal, from whom I repeatedly obtained over 20 lbs. of butter a week, on disconnected trials—546 lbs. in a year. She averaged in the worst 'fly time' a little over two pounds per day."

Hon. R. S. Houston, of Kenosha, Wis., who formerly for many years gave considerable attention to cheese-making, says concerning his herd of grade Jerseys:

"My herd consists of fifty cows from two to eight years old, from half to full bloods. My

stock does not show as well as it might, as I have sold almost all my young stock—all that were coming two years old. I have found the Jerseys hardy, docile, and easily kept. The following statement shows the milk and butter each month of the year. The milk was weighed as soon as drawn from the cow. It was put in the Hyde double-channel pan. The butter was weighed after working, ready for the salt. We began the season with fifty-six cows. During winter and spring we sold six. We have two families of fourteen persons to supply with milk. I have deducted twenty pounds a day for this:

|                      | Lbs. Milk. | Lbs. Butter. | Lbs. Milk for one<br>of Butter. |
|----------------------|------------|--------------|---------------------------------|
| January, . . . . .   | 18,403     | 899          | 20.4                            |
| February, . . . . .  | 16,914     | 811          | 20.9                            |
| March, . . . . .     | 23,321     | 1,006        | 23.1                            |
| April, . . . . .     | 28,533     | 1,321        | 21.6                            |
| May, . . . . .       | 36,997     | 1,750        | 21.1                            |
| June, . . . . .      | 31,701     | 1,532        | 20.7                            |
| July, . . . . .      | 27,246     | 1,286        | 21.2                            |
| August, . . . . .    | 27,623     | 1,319        | 20.8                            |
| September, . . . . . | 26,280     | 1,272        | 20.6                            |
| October, . . . . .   | 24,695     | 1,245        | 19.8                            |
| November, . . . . .  | 20,356     | 1,029        | 19.7                            |
| December, . . . . .  | 23,114     | 1,200        | 19.5                            |
| Total, . . . . .     | 305,493    | 14,670       | Av. 20.8                        |

Our cows were fed from January to May on corn-meal and bran, equal parts, 10 to 12 lbs. per day; through the month of May we fed bran alone; June, July, and August, grass only; September and October we fed sowed corn; November and December, corn and oats, equal parts, with corn from the stock; to-day we feed corn-meal and bran. The herd consists of fifty cows of  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and full blood. Ages, five two-year-olds, eight three-year-olds, others up to eight years old.

One great reason of our better success the last part of the year over the first was in handling the milk. We use the Hyde double-channel pan. The first part of the year we used it without water under the pan. Since that time we have run water in cold as well as in warm weather, heat of room 70 deg."

On the above estimate, that 20 lbs. of milk deducted each day, as used by the two families, fully offsets the quantity given by the six cows that were sold in the early part of the year, we have fifty cows which gave the very good average yield of 293.4 lbs. of butter each month during the year. The column giving the number of pounds of milk required to produce one pound of butter, for each month of the year, is an interesting one. Excepting for March, it will be noticed that there is comparatively little variation in the quantity from month to month.

Landseer's Fancy, a Jersey cow owned by a gentleman in Columbia, Tenn., is reported by her owner as yielding 17 lbs. 2 $\frac{1}{2}$  oz. of butter in seven days, and 71 lbs. 2 $\frac{1}{2}$  ozs. in thirty-one days.

Mr. Edward Burnett, of Deerfoot Farm, Southboro', Mass., gives the following account of the yearly milk yield in quarts, of several of his Jerseys, commencing with the year 1875. Those beginning after that year did so as heifers:

|           | Pink 3d. | Pink 4th. | Deerfoot<br>Maid. | Mab. | Patty. | Dolly. | Patty 2d. | Patty 3d. | Millic. | Deerfoot<br>Girl. | Dewdrop. | Polly. |
|-----------|----------|-----------|-------------------|------|--------|--------|-----------|-----------|---------|-------------------|----------|--------|
| 1875 .... | 7199     | 6757      | 2402              | 6510 | .....  | .....  | .....     | .....     | .....   | .....             | .....    | .....  |
| 1876 .... | 8432     | 8345      | 4947              | 7276 | 4865   | .....  | .....     | .....     | .....   | .....             | .....    | .....  |
| 1877..... | 8228     | 8375      | 6377              | 6438 | 5677   | .....  | .....     | .....     | .....   | .....             | .....    | .....  |
| 1878..... | 7870     | 6063      | 6371              | 6404 | 4886   | 4120   | 5041      | .....     | .....   | .....             | .....    | .....  |
| 1879..... | 6729     | 4752      | 7723              | 8462 | 5866   | 5822   | 6629      | 2575      | .....   | .....             | .....    | .....  |
| 1880..... | 5889     | 7235      | 8888              | 7134 | 7755   | 5863   | 5247      | 6349      | 5609    | 2334              | 5208     | 4811   |
| 1881..... | 7121     | 8723      | 8723              | 7618 | 7559   | 7414   | 6453      | 4347      | 5661    | 6050              | 5347     | 6584   |

At a recent State fair in Iowa, the following test of Jersey cows, from the herd of Mr. Charles J. Reed, of "Meadow Brook Farm," Fairfield, was made by a committee appointed by the Board of Directors for this purpose. Being kept chiefly as a breeding herd, no attempt had been made to push the cows to a high butter yield by gram food. They were pastured during the entire season on wild grass, white clover, and blue grass, until about two weeks before the fair, when they were put upon a second growth of timothy and clover, and five days previous to shipping were fed six quarts per day of ground oats. They were then shipped 125 miles by rail. The cows tested were: Rose of Hillside (3866), and Belle of Indiana (3867); these were milked in the presence of the committee, and the milk weighed by it and delivered to Col. R. M. Littler, secretary of the National Butter and Cheese Association, appointed to conduct the test. These cows were each five months in calf, and the milk weighed thirty-five pounds. This was drawn the first twenty-four hours after their twenty-four hours' shipment. The milk was given into Col. Littler's possession at 9.12 A. M., strained into a deep can  $8\frac{1}{2}$  inches in diameter and placed in a refrigerator at a temperature of  $42^{\circ}$ . As soon as the temperature of the milk was sufficiently reduced, the whole milk was churned sweet, and at 11.20 A. M. (two hours and eight minutes from the time of milking), the butter was churned, worked, and printed ready for the table.

The product was three pounds of butter, being at the rate of nine pounds per 100 pounds of milk, and  $1\frac{1}{2}$  pounds per day per cow, notwithstanding their long shipment and a fast of twenty-four hours during the journey. That all the butter was not obtained from the sweet milk thus churned was shown by cream rising on the butter-milk.

The best and fairest tests are those where the animal has not been forced by excessive feeding of certain kinds of food merely for the purpose of producing a high record. The health and breeding powers of valuable animals are frequently injured by this means.

**Alderneys.**—The Alderney breed is so nearly allied to that of the Jersey as to require no separate description. They are generally regarded as identical, although most of the Channel Island importations to this country are from the Island of Jersey and Guernsey, there having been in reality but few animals ever brought to this country from Alderney. See JERSEYS.

## GUERNSEYS.

**L**IKE the Jersey breed, these cattle derive their name from the island which is their original home, Guernsey being one of the Channel Islands, which are in many respects similar, and which, although belonging to England, lie near the coast of France. The cattle of these several islands are quite similar, although differing in some



respects, the Guernsey being larger in size and somewhat coarser in form than the Jersey, they having a more rounded body and less prominent bones, and seeming to partake more of the characteristics of the Normandy races of cattle. Cows of this breed have been known to weigh as high as from 1,200 to 1,300 pounds, and beef animals on the island are said to reach 2,000 pounds; these weights are, however, considerably above the average weight. These cattle are remarkably gentle and affectionate in disposition. On their native island, where they are in almost all instances tethered, their

care is usually confined to the women and children, which fact probably accounts in a great measure for their extreme docility.

It is not an uncommon sight on the island to see one woman leading half a dozen cows at once from the barn to the field. These cattle are not as common in this country as the Jerseys, having until recently been imported almost exclusively to England, where they are much prized for private dairies. As they are so closely allied to the Jersey breed, of which a previous and somewhat extended description has been given, a brief space will only be required for them in this connection.

**Description.**—The Guernsey cow is generally from one hundred to two hundred pounds heavier than the Jersey, although lacking, to a certain extent, some of the deer-like points that the latter possesses. They are, however, equally mild and affectionate in disposition, even the bulls being very docile. The color is generally orange fawn and white, or orange red and white, although dark breeds and brindles are sometimes seen. The circle about the eyes and nose is generally lighter than the prevailing color, although not white.

The skin is soft and of an orange tinge when seen through the hair. This color is also

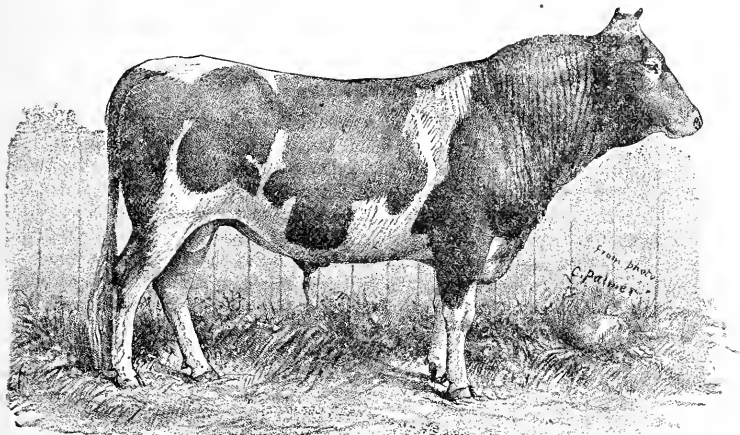
seen in the eyelids, on the inside of the ears, and about the base of the horns, which are fine in texture and waxy in feeling. The following is the scale of points adopted by the American Guernsey Cattle Club:

#### SCALE OF POINTS FOR GUERNSEY COWS.

| QUALITY OF MILK.  |    | Counts. | Points. |  | Counts. | Points. |
|---|----|---------|---------|--|---------|---------|
| Skin deep yellow, in ear, on end of bone of tail, at base of horn, on udder, teats, and body generally, | 20 |         |         | Udder full and well up behind,                               | 8       |         |
| Skin loose, mellow, with soft, fine hair,   | 10 | 30      |         | Udder large, but not fleshy.                                 | 4       |         |
|   |    |         |         | Udder teats squarely placed,                                 | 4       |         |
|   |    |         |         | Udder teats of good size,                                    | 2       | 40      |
| QUALITY AND DURATION OF FLOW.   |    |         |         | SIZE AND SUBSTANCE.  |         |         |
| Escutcheon wide on thighs, high and broad,  | 10 |         |         | Size of the breed,   | 5       |         |
| With thigh ovals,   |    |         |         | Not too light bone,  | 1       |         |
| Milk veins long and prominent,  | 6  |         |         | Barrel round, and deep at flank,                             | 4       |         |
| Udder full in front,  | 6  |         |         | Hips and loins wide,   | 2       |         |
| SYMMETRY.   |    |         |         | Rump long and broad,   | 2       |         |
| Back level to setting on of tail,   | 3  |         |         | Thighs and withers thin,                                     | 2       | 16      |
| Throat clean, with small dewlap,  | 1  |         |         | Head rather long and fine, with quiet and gentle expression, | 3       |         |
| Legs not too long, with hocks well apart in walking,  | 2  |         |         | General appearance,  | 2       | 14      |
| Tails long and thin,  | 1  |         |         |  |         |         |
| Horns curved and not coarse.  | 2  |         |         |  |         |         |
|   |    |         |         |  | 100     | 100     |
|   |    |         |         | For bulls and heifers deduct 20 counts for udder.            |         |         |

For bulls and heifers deduct 20 counts for udder.

**Dairy Characteristics.**—Like her sister the Jersey, the Guernsey cow produces very rich milk which yields a large proportion of cream and butter, the latter being of the



GUERNSEY BULL.

Owned by L. W. Ledyard, Cazenovia, N. Y.

best quality, and of a deep yellow color. It is claimed by the admirers of this breed, that one good Guernsey cow in a herd of ten, will noticeably change the color and character of the butter.

The Guernsey milk makes very nice, rich cheese, yet it is most highly valued for butter production and as a luxury for the table. Although little or no grain is generally fed on

the island, the principal food of these cows being the grasses that the moist climate affords nearly the entire year, the records of butter production there, give an average of one pound per day for the whole year, while the choicest cows have been known to double that amount. In several experiments made in this country, a pound of butter has been made from between seven and eight quarts of milk, and it is stated by good authority that in the Farmington (Connecticut) creamery, the milk of twenty Guernsey cows colored the butter from 500 cows. This breed readily transmits its valuable characteristics, and grades of about three-fourths blood are frequently found to fully equal the pure bred animals in milk production.

As a beef breed, the Guernsey cannot be highly recommended, beef qualities being secondary to dairy characteristics. They will, however, fatten quite well when dry, and make very good beef. A recent writer says in this connection:

"There are cows that will fatten well when dry, and the Guernsey will be found among them, but it is so secondary a consideration that it is not entitled to the weight usually given it. Few men buy a heavy stove that will consume much and heat but little from a desire to have it sell for old iron after many years, but many will carry a poor butter cow many winters and then feed her twenty-five dollars worth of mill-feed to sell her for old cow beef at thirty dollars. It is too late for this economy, when the great natural grazing plains are sending in superb beef cattle that have cost only "herding," and dairy farmers should find it out. A good butter cow, one that converts her food into not only a large amount of butter, but into high-priced golden butter, should pay every year her *full beef value over and above* the product of the average "universal cow," and a good milch cow, such as a Holstein, should equally exceed the common cow in her profitable performance."

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## AYRSHIRES.

**T**HIS breed originated in the county of Ayr, in the southwestern part of Scotland, and has long been celebrated in Great Britain and this country for its excellent milking qualities. Its origin is supposed to be due mainly to the crossing of the English Short-Horn bull with the common Kyles cow of Scotland, the progeny being improved with reference to their milking qualities, until this characteristic became established and transmissible. Other breeds were doubtless used in improving these cattle, thus Rawlin says, in writing of the Ayrshire:—"They have another breed called the Dunlop cow, which are allowed to be the best race for yielding milk in Great Britain or Ireland, not only for large quantities, but also for richness in quality. It is said to be a mixture by bulls brought from the Island of Alderney with their own, or the old race of cows." Martin also states, "At some period or other, there has evidently been a cross with the Durham or Holderness, and perhaps also with the Alderney breed." Professor Low, in his illustrations of British quadrupeds, says: "From the evidence of which, in the absence of authentic documents, the case admits, the dairy breed of Ayrshire cows owes the characteristics which distinguish it from the older race, to a mixture of the blood of the races of the continent, and of the dairy breed of Alderney."

Careful selection in breeding, and the better system of management that was generally adopted soon after the early attempts towards improvement, doubtless had great influence in changing the general character of the stock of that region, as would be the case with any breed. The original stock which forms the basis of the Ayrshire breed are described by Aiton as of diminutive size, ill-fed, ill-formed, and yielding but a scanty supply of milk. They were mostly black in color, with large stripes of white along the chine and ridge of the back,



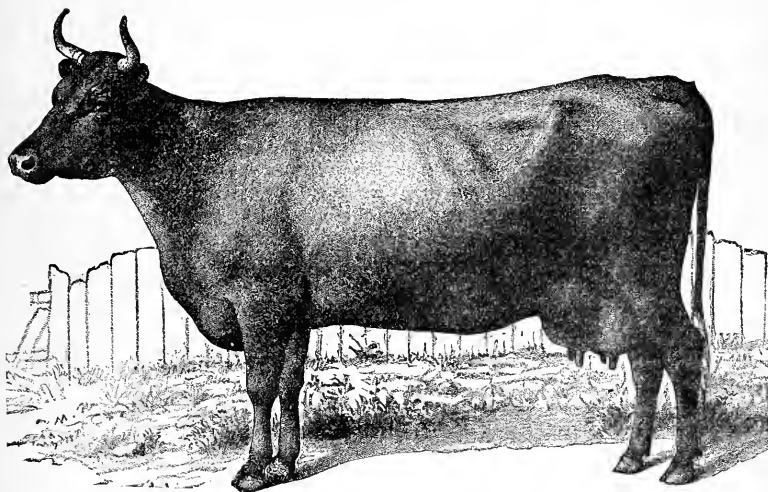
M. J. B. 1861.

**AYRSHIRE BULL, "HONEST JOHN."**  
Owned by William Birnie, Springfield, Mass.



and about the flanks. They had also frequently more or less white about the face. They had high, crooked horns with deep ringlets at the root, thick hides adhering to their bones, and few of them yielded more than six or eight quarts of milk a day when doing their best, or weighed when fat more than from twelve to sixteen or twenty stones avoirdupois.

He subsequently says: "It was impossible that these cattle, fed as they then were, could be of great weight, well-shaped, or yield much milk. Their only food in winter and spring was oat-straw, and what they could pick up in the fields, to which they were turned out almost every day, with a mash of weak corn and chaff daily, for a few days after calving; and their pasture in summer was of the very worst quality, and eaten so bare that the cattle were half starved, and had the aspect of starvelings. A wonderful change has since been made in the condition, aspect, and qualities of the Ayrshire dairy stock. They are not now the meagre, unshapely animals they were forty years ago, but have completely changed into some-



AYRSHIRE COW.

Property of Alex. M. Fulford, Bel Air, Maryland.

thing as different from what they were then, as any two breeds in the island can be from each other. They are almost double the size, and yield about four times the quantity of milk that the Ayrshire then yielded. They were not of any specific breed, nor uniformity of shape or color; neither was there any fixed standard by which they could be judged."

Better feeding and care, as well as judicious crossing, must have been the combined cause of the great improvement of these cattle. The Ayrshires were first introduced into the United States about the year 1822, but were imported in larger numbers about the year 1830. They were at that time usually of a dark red or brown color, flecked with white, having black noses. Those more recently imported have seemed to be more of the Short-Horn type, as far as color is concerned, the red being of a lighter shade, with more of white. They are quite hardy, and adapt themselves to the climate and conditions of this country very readily, although as a breed they do not produce as much milk in quantity as in their native

country, where the moist climate causes the pasturage to be fresher and greener than ours, and where, owing to the modifying influence of the warm waters of the Gulf Stream, a more equable temperature prevails than in this country, there being less extremes of heat and cold.

As a breed they are not as docile as some others, being naturally inclined to be irritable in disposition. For this reason they are not as desirable for working oxen, although this objection may be overcome to a certain extent by kind and gentle treatment.

**Description.** — In size, the Ayrshires are smaller than the Short-Horns, and although resembling them somewhat in contour, they are not as symmetrical. The breed is small, fine, and clean; the face long and narrow at the muzzle; forehead wide; eyes rather small and lively in expression; horns wide apart where they join the head, of medium length, inclining upwards, and curving slightly inward; neck long, slender, and straight, free from loose skin underneath; shoulders thin at the top; fore-quarters light in front but increasing in depth and width backwards; hind-quarters large; back short and straight, broad behind, joints rather loose and open; ribs rather flat; carcass deep; pelvis broad and hips wide apart. Tail long and slender, and set on a level with the back; udder capacious and extending well forward; teats of medium size, set wide apart; milk veins well developed; legs short with firm joints; bones fine; skin thin and elastic, covered with soft, woolly hair. In color they vary considerably, red and white, spotted or mottled being the most common, the two colors presenting a striking contrast. They are sometimes brown and white, and black and white, and occasionally, though not often, nearly or quite red; roans are also sometimes seen, also yellow and white, but less frequently than the colors previously mentioned.

Mr. Aiton says that the Ayrshire farmers prefer their dairy bulls according to the feminine aspect of the head and neck; also select for this purpose those that are not round behind, but bowed at the hock-bones and hips, and full in the flanks. The Ayrshire makes a good cross with the native or common stock of the country, and also with the Short-Horn. A high-bred Short-Horn bull and a large-sized Ayrshire cow will produce a calf which, in the opinion of good breeders, will come to maturity earlier and attain a greater weight, and consequently sell for more profit than a pure-bred Ayrshire. Such a cross will also produce more symmetry of form than is found in the latter-mentioned breed.

**Dairy Characteristics, etc.** — For dairy purposes, the Ayrshire cow has long been justly celebrated, her milk being rich in quality and large in quantity in proportion to her size and the amount of food consumed. In their native country the Ayrshire is bred almost exclusively for the dairy, and seldom for other objects. In this country the breed has attained great favor, especially in New England and the Middle States, where at one time it was regarded as having no superior for dairy use. To show what Ayrshires have accomplished in milk production, we will give a few items of record, obtained from various authentic sources.

The Ayrshire cow known as "Old Creamer," was in her time the champion milch cow of the world. She was owned by Hon. L. D. Hungerford, of Valley Park Farm, Adams, N. Y., and won the first prize at the New York State Fair in 1873, having yielded in three days the enormous quantity of 304 lbs. of good milk, as follows: June 11th, 102½ lbs.; June 12th, 100 lbs.; and June 13th, 101½ lbs. She gave 2,820½ lbs. of milk in the month of June, an average of over 94 lbs. per day; 2,483½ in the month of July, an average of over 80 lbs. per day; and in the month of August, 75 lbs. per day. She was at this time nine years old, and weighed 1,080 lbs. The following is the statement of Messrs. Sturtevant, of South Framingham, Mass., giving the results attained in their dairy with the Ayrshire breed.

"Ayrshire cow 'Jennie,' five years of age; last calved, August 29th. When four years old she gave, for the first week of September, 143 pounds of milk; for the first week of November, 128 pounds; total yield for the year, 5,870 pounds.

Ayrshire cow 'Tilly,' five years old. Dropped last calf April 13th. Her yield for May was 1,071 pounds (first week of May, 161 pounds); her yield for June was 1,062 pounds; for July 840 pounds (first week of July, 219 pounds); for August 724½ pounds. Under date of June 12th, I take the following record from the books: 'Tilly is fed on cut grass and one quart of oil-meal. At no time has she been fed as high as the other cows. At no time more than seven quarts of shorts, with long hay and one quart of either corn or oil-meal.' In July, no grain; in August, one quart corn-meal daily.

This is only a portion of the systematic record of the dairy. No efforts have been made for an extraordinary yield. Excellent calves. On one trial, Jersey gave 15 per cent. cream; Tilly (Ayrshire) gave 9 per cent; average natives, 7½ per cent.

'Fannie,' seven years of age. Calved Dec. 25th. Yielded in January 1,090 pounds (first week of January, 273 pounds); in February, 874 pounds; in March, 822 pounds (first week of March, 190½ pounds); in April, 714½ pounds; in May, 683 pounds; in June, 694½ pounds; in July, 559½ pounds; in August, 450½ pounds. In June, July, and August fed on green food. During winter and spring months, consumed, on a daily average, nine quarts shorts, one quart linseed meal, and two quarts corn-meal, with corn stover and a poor quality of hay. Excellent calves. On one trial, Jersey gave 15 per cent. cream; Fanny (Ayrshire) gave 8½ per cent.; average natives, 7½ per cent."

The Waushakum herd of thirteen Ayrshires, of which a daily record of milk yield was carefully kept for eight years, showed an annual average of 2,515 quarts per cow; while a three years record of another herd of eleven cows of this breed gave an average annual milk yield of 2,587 quarts each. Low says that healthy Ayrshire cows in good pastures give from 800 to 900 gallons of milk each year. Martin makes the statement that the milk of a good cow of this breed will afford 250 pounds of butter or 500 pounds of cheese annually.

Haxton, after giving many statistics to demonstrate the value of the Ayrshire as a dairy animal, mentions one which shows that in one dairy of thirty cows the average annual yield of milk was 632 gallons each, and that nine and a quarter quarts produced a pound of butter, amounting in the aggregate to 274 lbs. in a year.

Although rich in quality, the milk of the improved Ayrshire does not, in this respect, equal that of the Jersey and Guernsey, which in many sections are gradually taking its place; still, as a dairy animal, the former must ever occupy a high place, and be classed among the superior milk breeds of the country. A cow that is of a quiet and contented disposition feeds at ease, is milked with ease, and yields more than one of an opposite temperament; while after she is past her usefulness as a milker, she will easily take on fat and make fine beef and a good quantity of tallow, because she feeds freely, and when dry, the food which went to make milk is converted into fat and flesh. But there is no kind of cow with which gentleness of treatment is so indispensable as with the Ayrshire, on account of her naturally nervous temperament. If she receives other than kind and gentle treatment, she will often resent it with angry looks and gestures, and withhold her milk; and if such treatment is long-continued, will dry up; but she willingly and easily yields it to the hand that fondles her, and all her looks and movements towards her friends are quiet and mild. For beef production the Ayrshires are of course not equal to the Short-Horn and some other breeds, having been bred solely for furnishing milk for so long a period. They however fatten quite readily, and make very good beef. They are thought by some to unite to a greater degree than any other breed the seemingly incompatible qualities of yielding a large amount of milk, and producing good beef.

## DUTCH.

**T**HE climate of Holland, together with its rich and luxuriant pasturage, so moist and succulent, would naturally tend to the production of cattle of a large growth of animal frame, and milk-yielding capacities. We therefore find that although the different races of Dutch cattle differ in some respects, there are some general characteristics in them all, prominent among which are those previously mentioned, namely, large size and the yielding of a large amount of milk. These cattle have long been bred in their native country, which is one of the best for dairy purposes in the whole world,—especially for the production of milk; and when we take into consideration this fact, and the naturally favorable soil and climate which their native country affords, it is not surprising that we find the Dutch cow of the present time one of the largest of milk-producers. These animals were early imported by the colonists of this country, especially in New York and New Jersey, and have always maintained their good reputation for large yields of milk, although the quality is not quite as rich as that of some other breeds.

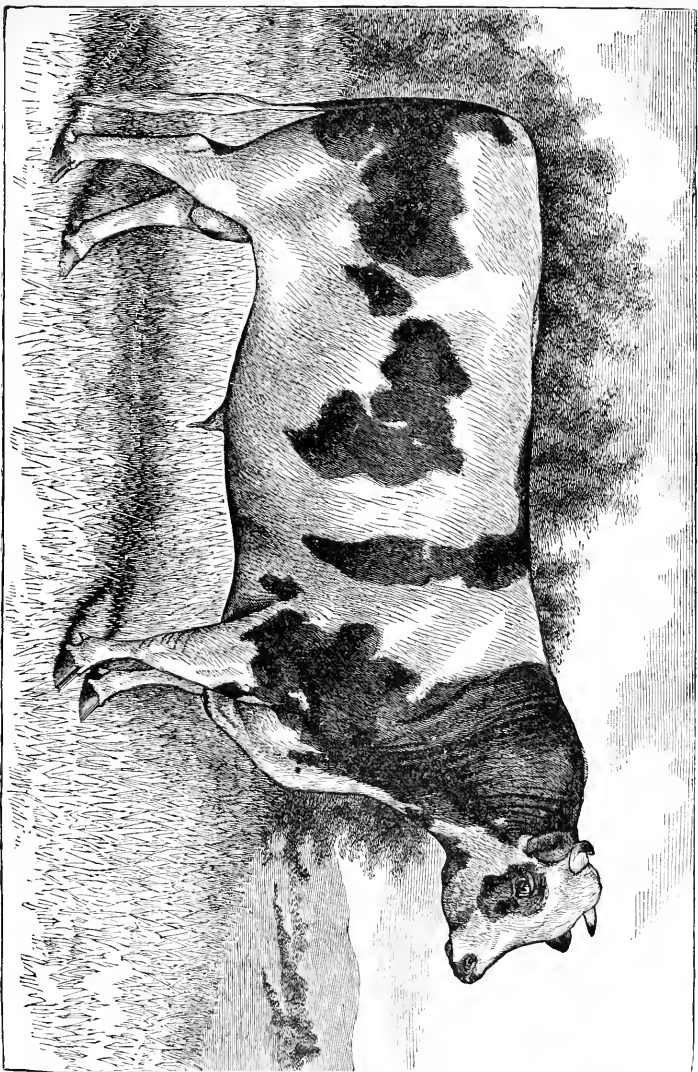
With regard to the origin, varieties, etc., of these cattle we make the following extract from the pen of Prof. Hengerveld, of the Royal Veterinary Institute, Utrecht, Netherlands:

“It may be taken for granted that the Dutch cattle trace their pedigree from the time when the Friesians and Batavians settled on the banks of our great rivers, about one hundred years before our era; they are the lineal descendants of that race of cattle. These nations were engaged in fishing and in tending their herds when not compelled to serve under the Roman standards. The nature of the soil at once indicated their system of agriculture, which was very plain and rude—their object being to get as much milk and beef as possible, while the hides of their cattle were used for garments. Under the Romans, who could boast of a more regular system of husbandry, they improved their farms, and the feeding and management of their cattle. These improvements were entirely founded upon the Roman system. Several large farmhouses remain at the present time as evidences of that ancient system. The old castle, with its various stables, was surrounded by kitchen gardens, woods, meadows, orchards, duck ponds, moats, canals, and ditches, by farmhouses with their cow-houses and barns, while the whole was enclosed when possible by some branch of a river. This is a picture of an ancient Roman villa with its surroundings. It is true from that time up to the present many changes have been effected and the estates are less extensive, but in the main everything shows an exact imitation of the Roman villa. Observing these things, we conclude that during many centuries the lodging, management, and methods of turning cattle to good account have undergone but little, if any change. A continual crossing with the same breed with little importation, or mixing with foreign animals, caused the original race to remain unaffected by foreign influence. Only in the northeastern and in the southeastern borders of our country do we meet with crosses of the German and Flemish cattle.

It is true that sometimes inundations, cattle diseases, and wars have threatened these cattle with decrease and even destruction, but the farmers have gone on breeding with what was left. About one hundred years ago, during the cattle plague, some small German cattle were imported into Friesland. Their management and crossing, and the conditions of climate and soil, soon caused them to possess the qualities of the native breed. The origin and purity of the thoroughbred race may thus be traced back two thousand years.

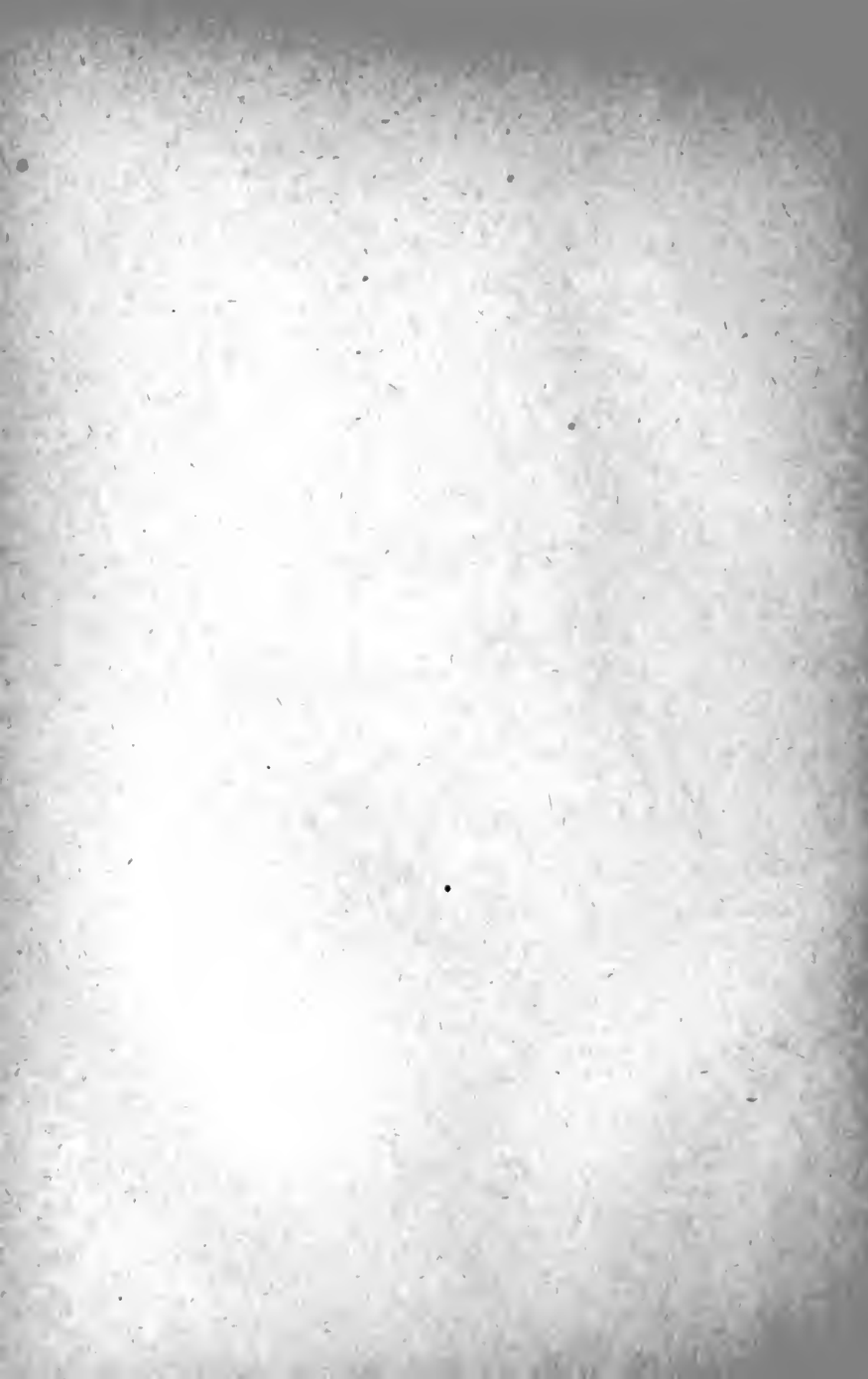
**Description, etc.**—“The form proper to this breed of cattle has proceeded from and is identified with their use, lodging, feeding, and management. They have adopted a type or originality peculiar to this stock, and through coupling this has become constant. This bodily construction may be called the *milk shape*.

**Varieties.**—Notwithstanding the general uniformity of the Dutch cattle, we meet some-



**HOLSTEIN BULL, "2d CONSUL."**

Property of Dexter Severy & Son, Ireland, Ill.



times with varieties, differing in size and beauty; a slight difference is also sometimes to be observed in color and in the shortness of the horns. These varieties are the results of differences in the nature and fertility of the soil upon which these cattle have long been bred and reared.

Thus these cattle may be divided into large, medium, and small. The largest cattle are to be found on the salt water alluvions along the seashore, on the islands, and on the marshy grounds washed up by the sea—lands rich in clay. They are also found on the sweet water alluvions of the great rivers, on the drained lakes, and on the loamy grounds containing a great deal of clay. Another somewhat smaller kind of large cattle, of a finer shape and more beautiful symmetry, is found on the fertile, loamy, and peaty grounds of the lowlands. Medium-sized cattle are found upon the lowest, peaty, loamy, and moist soils, which contain much acid, on lands covered with water plants and grass of small nutritive value, and also on the tilled, dry soils, which contain a smaller proportion of clay and humus. The smallest cattle are found on the diluvions and on the heaths.

Consequently, we find large cattle in the provinces of Groningen, Friesland, North Holland, and in some parts of North Brabant and Limburg. Somewhat smaller cattle, but of fine form, in the northwest part of Groningen, on the peaty soils of Linsterland, along the Yessel, and on some rich loams of South Holland.

*Color.*—As to color, the following observations may be made: Our farming ancestors kept chiefly white cattle; the remainder were black or brown spotted. The white cattle of the Bavarians are famous in history. Some centuries later we read of white cows and oxen given as tribute to the counts of Bavaria, the princes of Spain, etc. At a still later period date the brown spotted bull and grey cow of Paul Potter. Besides the white cattle, we have now the black and white variegated, and the roan cows of Groningen, Friesland, and North Holland. The black and white variegated in the many truly fine varieties are most numerous. Some foreigners prefer these variegated cattle, doubting the purity of the other colors. This is a great mistake. About twenty-five years ago, the so-called black whiteheads, from the loams of Groningen, were generally preferred and used for breeding purposes. Neither are the red variegated cattle rare. These also belong to the thoroughbred stock.

*Horns.*—Another prominent characteristic of Dutch cattle is the style of the horns. In this respect they are classed with the Short-Horn races. The direction of the horns is oblique and horizontal, sometimes curved upwards; the downward curve, however, is considered as a desirable mark in milking stock. It is even supposed that the shortness of the horns has a great deal to do with the fineness of the shape. Though it may not be true in every respect, yet the exquisiteness of form and quality depends much upon the network of the horns and the fineness of the hair. It may be shown, on physiological grounds, that long horns take away nutritive matter, especially azotic substances, to the great disadvantage of the bodily development, and consequently the production of beef and milk. Breeders are therefore quite right in paying particular attention to the shortness of the horns.

The milk form, variegated colors, and short horns are three prominent external points proper to all Dutch cattle wherever they may be bred. These are points that they have possessed ever since the formation of the breed, and are strongly hereditary.

*Flexibility.*—The important quality called *flexibility*, or ease of adaptation to outward circumstances, though belonging, to a greater or less extent, to all races and breeds of cattle, is one of the principal characteristics of the Dutch Friesian breed, and makes them acclimatize in other countries with but little or no change in their productiveness. The cattle imported a hundred years ago into Anspach, the cattle sent to Bremen, Holstein, and Berlin, the Dutch cattle in Hohenheim and Rosenstein, imported by the King of Wirtemberg, the Bohemian Dutch cattle, and these cattle in France, Germany, Russia, and lately America, are so many evidences of this. They all retain their original form, colors, and qualities.

**Dairy Characteristics, Quantity of Milk.**—"Much pains has been taken in foreign countries to keep an account of the quantity of milk yielded by the Dutch-Friesian cows, and to compare it with the yield of the most productive breeds of other races. In the yearly quantity of milk yielded by the Bern, Simanthal, Allgau, Limburg, and Ayrshire cattle, in some instances, the result has been in favor of the Bern, Simanthal, and Allgau breeds; but generally the superiority has been with the Dutch. The Limburg and English breeds, in which we include the Ayrshire, cannot be compared with them.

The quantity of milk depends much upon the locality from whence the Dutch cattle are selected, whether from a clayey, loamy, peaty, or sandy soil. If we compare the cattle bought by the Germans on the eastern borders of our country with the cattle bred on our rich pastures, we find that the yield of the latter is far superior to that of the former.

In order to obtain a correct comparison of the yield of milk of different breeds, the large, medium-sized, and small animals of each breed should only be compared together.

In my description of the South Holland cattle, the large and medium-sized cows, under which we may also range those of Groningen and Friesland bred on clayey and loamy soils, 3,500 litres\* a year I have given as the average yield. It is stated by many a landowner or farmer that, from time to time, their productiveness amounts to 5,000 or 6,000 litres. Cows yielding those quantities are not at all rare. We, therefore, conclude:

1st. The yield, 3,500 litres a year, is but a medium quantity, and cannot be accepted as the yield on the clayey, loamy, and peaty soils of North Holland and Friesland.

2dly. Though portions of North Holland are sandy and dry, yet the cattle belong to the large variety, and these larger cattle are very superior to the best Swiss and Allgan, and even to that exquisite milk breed known under the name of Rosenstein and Wirtemberg.

*Quality of Milk.*—"Another characteristic of these cattle is the richness of their milk. This also has been often examined and compared with the milk of other breeds; sometimes, however, without regard to the many circumstances on which depend the percentage of cream and butter, viz., constitution, age, manner of feeding, time of calving, milking two or three times a day, milking dry or not, morning or evening's milk, dry or green fodder, winter or summer time, etc. All this waiting for closer examination, it may be said with some certainty that only the mountain cattle races, including the small Alderney cattle, possess a higher percentage. The importation of mountain cattle into our low countries, in this respect, has led to no favorable results. The caseous or cheesy matter in the milk of all our native cattle varies from 8 to 16 per cent., the butyraceous or fatty material from  $2\frac{1}{2}$  to  $4\frac{1}{2}$  per cent., depending on the various circumstances.

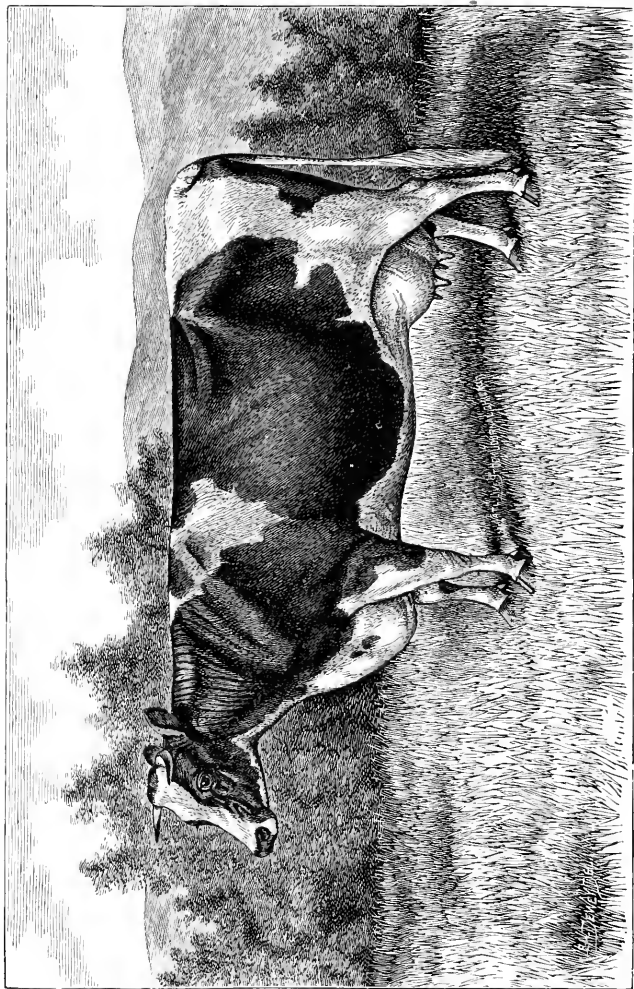
Compared with the rich milk of the best foreign cattle, the difference is but slight; and it may be stated that this breed yield the most abundant quantity of a highly butyraceous milk. The average quantity of cream is 10 to 11 per cent., with which the butyraceous quantity of 3 to  $3\frac{1}{2}$  corresponds. Baumhauers' experiments show a difference of cheesy and butyraceous matter of 0,210 to 0,469. From these facts we see that the quantity of butter is such as to allow our best milch cows to vie with any other breed. Except the accurate experiments and examinations of Dutch milk by Professor Baumhauers, no others are known to me. I have intentionally pointed out the quantity of butyraceous milk matter, because, judging from the information derived from abroad, some foreigners doubt this, by which they disparage unjustly the quality of this breed; therefore, I add, that caseine, butter, and sugar of milk are to be found in their milk in as large quantities and of as excellent quality as in any other milk breed, with the exception of the Alderney, and possibly some of the mountain cattle, which they greatly surpass in productiveness."

From the above authority, the high estimate placed upon the cattle in their native

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\*The litre is nearly the same as our wine quart, the difference being so slight as not to be worth considering in this connection.





IMPORTED HOLSTEIN HEIFER, "MEIKA."  
(Age 2 years, weight 1,250 lbs.) Property of Geo. E. Brown & Co., Aurora, Ill.

county will be seen. In this country they are highly valued as milk producers, and are most commonly found in the best grazing sections, such as the Western and some of the Middle States, to which they are admirably adapted. They are noted more particularly for large yields of milk rather than the richness of its quality, although owners of this breed claim that large quantities of butter can be made from it. It is also especially adapted to the manufacture of cheese.

## HOLSTEINS.

THERE has been much discussion among breeders in this country with regard to the use of the term "Holstein" as applied to the cattle which it is sometimes used to represent, it being often used in connection with "Dutch," which is inappropriate, since the Holstein races, of which there are several, differ in many respects. Professor Hengerveld, previously quoted, says in this connection:

"In the Netherlands Herd Book every animal is described from the province in which it was bred: 'Noord Hollandsch veeslag,' 'Friesche veeslag'—literally North Holland kind, Friesian kind. In the certificates of breeding required to entitle imported animals to registry in America, these two kinds are regarded as identical, and are described as 'pure North Holland, or Friesian black and white piebald cattle.' Upon arriving in America, however, they are popularly given the name 'Holstein.' This name is a peculiarly unfortunate one, from the fact that there is a breed in the province of Holstein differing widely from this breed, to which Europeans have very properly attached the name Holstein. Hence it is very likely to lead to misunderstanding and confusion as intercourse increases between American and European breeders; besides it robs the true originators of the breed of the honor justly due them."

Without stopping to discuss the question, we will simply state that the term "Dutch" cattle is generally understood to apply to the common breed in Holland, while the name "Holstein" has become popularized in this country, and is regarded as referring to the large improved black and white cattle, derived from North Holland and adjacent provinces, or the descendants of these animals. Mr. Charles Houghton of Boston, explains how the name "Holstein" came to be adopted, as follows:

"Previous to and for some time after 1871, Mr. Winthrop W. Chenery of Belmont, Mass., was the principal if not the only importer of Holstein Cattle for purposes of improvement.

In March, 1871, about ten persons, to whom Mr. Chenery had previously supplied one or more Holstein animals each, at his suggestion united with him in an association called The Association of Breeders of Thoroughbred Holstein Cattle, with a constitution and by-laws, and a register of all the pure-blooded animals of that race owned by them. The principal object of this association was and is to keep and preserve a register of animals known to be of pure blood, and of their progeny, including future importations.

At that time the persons uniting in the association knew of no name by which this race of cattle were generally known in Holland and the neighboring provinces. They had been usually called 'Dutch' or 'Holstein' by Mr. Chenery and his associates.

In 1864, Mr. Chenery was requested by the Department of Agriculture, at Washington, to contribute an article upon the cattle in question for publication in the Commissioner's Report. The paper was prepared and forwarded to the Department with the title of the 'Dutch Cattle.' In due time the article appeared in the Commissioner's Report with the title changed from 'Dutch' to 'Holstein Cattle.' This circumstance, together with the fact that no other name more appropriate could be suggested, decided the question of name, and Holstein was adopted."

Since that time large additions to the number of these cattle in the United States have been, and are still being made by frequent importations, as well as by breeding, where they seem to adapt themselves readily to the climate, and grow as large as in their native country, the pure-bred descendants of those imported fifteen or twenty years ago being fully as valuable in all respects as fresh importations of the finest selections in Holland. The pure-bred Holstein bull almost invariably marks his progeny, even if bred to a Short-Horn.

**Description of Holsteins.**—The general form of the Holstein breed is that indicative of great milking quality, the udder being very capacious, and of unusual depth and breadth, with well developed and prominent milk veins running well forward, and good sized teats set well apart. The head should be finely moulded, forehead and face somewhat concave; nose dark, nostrils large; eyes rather full, clear and sparkling, yet mild; ears moderately large and standing out from the head; horns thin, short, and well curved. The body should be compact and massive; well formed, with rather broad hind parts, straight back, round but moderately bent ribs; well developed belly; fine bones, and suitably stout, but not heavy legs; smooth joints; thin, mellow skin; soft, short hair; tail rather long and slender, with a thick bushy tuft of hair at the end.

A recent writer in Holland in describing the beau ideal of this breed, says, in connection with the milking qualities: "The udder should be broad and drooping, well developed milk and blood vessels; veins on the belly and about the udder to be proportionately broad and vigorous, and of a wen-like swell, and the veins of the udder and inner hams to spread net-like; the openings through which the milk and blood veins enter the body to be large and roomy. A cow thus formed is also apt to show a perfect escutcheon."

The color is black and white, spotted or mottled in greater or less inequalities of proportion on the body. These cattle are gentle and docile, and the oxen, for those of such large size, make excellent workers. A four year old bull of this breed is said to girt seven feet and ten inches, the length of body eight feet and ten inches; height four feet and eleven inches; weight 2,465 pounds. When fattened, the oxen often attain a weight of from 2,500 to 3,000 pounds, while the cows range from 1,200 to 2,000 pounds. They are a hardy breed and large feeders.

**Dairy Characteristics of Holsteins.**—This breed is reputed to exceed all others in the amount of milk produced. Unlike the Jerseys and Guernseys, Holsteins are remarkable rather for the quantity, than richness of milk, although in this latter respect they excel some breeds, the milk being of very fair quality, and is perhaps better adapted to the manufacture of cheese, than butter. Their prominent characteristics have caused them to be much sought after, especially in those sections where pasture is abundant, and dairying is one of the leading agricultural industries. By tests, as shown by experiments made at two of the agricultural stations of Prussia, in one case with the same care and in the same time, the Ayrshire produced 2,247 quarts of milk, and the Holstein 5,677 quarts; the first consuming nine pounds of hay for every quart of milk, and the latter five pounds. It is stated by good authority that one cow of this breed, which had recently been imported, and which had dropped her calf on the 15th of May, weighing one hundred and one pounds, gave from the 26th of May to the 27th of July, according to a carefully kept record, four thousand eighteen pounds and fourteen ounces of milk.

The largest yield of milk in any one day was seventy-six pounds and five ounces, or thirty-five and one-eighth quarts. The average of this cow for ten days was seventy-four and forty-seven hundredths pounds per day, and the amount of cream produced from this milk was twenty-two and seventy-one hundredths per cent. Six days' milk of this cow produced seventeen pounds and fourteen ounces of butter. The above is certainly an excellent record in butter production as well as milk. The cow of this breed named Texelaar, formerly owned by

Mr. Winthrop W. Chenery of Mass., gave a record of seventeen pounds and fourteen ounces of butter per week; a heifer of this cow,—Texelaar 9th,—gave fourteen pounds per week; Snow Flake at two and a half years, ten pounds per week. Messrs. Smith & Powell have given the result of tests with their breed in the Dairy Department as follows:

“Neilson, seven years old, has given 74 lb. 12 oz. of milk in a day, 2,043 lbs. 12 oz. in one month, 8,668 lbs. 7 oz. in five months. Jannek, seven years old, 71 lbs. 12 oz. in one day, 2,008 lbs. 3 oz. in one month, 8,202 lbs. in five months. Aggie, six years old, has given 84 lbs. 12 oz. in one day, 2,362 lbs. 2 oz. in one month, 8,231 lbs. 1 oz. in four months. Her fifth month is not yet completed. Egis, six years old, 82 lbs. 12 oz. in one day, 2,197 lbs. 12 oz. in a month, 9,522 lbs. 7 oz. in five months, and 10,648 lbs. 3 oz. since commencing her record, February 22d, to date, August 16th. Sappho, three years old, has given 64 lbs. in one day, 1,717 lbs. 6 oz. in one month, 4,381 lbs. 6 oz. in three months. Lady of the Lake, two years old, dropped her calf on February 20th, when about twenty-two months old, and gave, before she was two years old, 45 lbs. 13 oz. in one day, and 1,284 lbs. 9 oz. in one month. She has given, in five and a half months, 6,624 lbs. 2 oz. Imogene, two years old, gave 47 lbs. 4 oz. in one day, 1,227 lbs. 6 oz. in one month, 4,598 lbs. 15 oz. in four months.

As we are short of pasture, we depend mainly upon soiling them. They are turned to pasture part of the day, and during the night in yards. The balance of the time they are kept in the stable and fed grass, oats, and fodder-corn, each in its season. Our grain feed is composed of bran and ground oats, equal parts, with about enough corn meal to supply each cow half a pint per day. Of this mixture we feed our two-year-old cows 5 lbs. per day; three-year-olds, 5½ lbs. per day, and older cows, 8 lbs. per day. Earlier in the season we fed more bran in proportion to the feed, and twenty-five per cent. more weight.”

From a report of the Elmira Farmer's Club, we obtain the following record of Colonel Hoffman's herd of Holsteins, of Horseheads, N. Y., it being the most complete of any of this kind that we have been able to procure. The first seven are thoroughbreds and the last four grades:

|  | Lbs. Milk. | Days in Milk. | Cream Standard. | Average lbs. Milk, 4 years. |
|--|------------|---------------|-----------------|-----------------------------|
| Janeka, . . . .                            | 10,228     | 335           | 11              | 10,084                      |
| Jufrou, . . . .                            | 12,992     | 365           | 13              | 11,820                      |
| Gentle Annie, . . . .                      | 9,143      | 350           | 11½             | 9,076                       |
| Holland Princess, . . . .                  | 7,014      | 291           | 13              | —                           |
| Beauty, . . . .                            | 11,313     | 365           | 11½             | 8,218                       |
| Belle, . . . .                             | 9,901      | 323           | 12½             | 7,650                       |
| Constance, . . . .                         | 8,750      | 318           | 12¼             | —                           |
| Peitji, . . . .                            | 9,667      | 350           | 13½             | —                           |
| Louise, . . . .                            | 9,468      | 337           | 16¼             | —                           |
| Black Twin, . . . .                        | 8,998      | 313           | 13½             | —                           |
| Polley, . . . .                            | 9,829      | 337           | 12½             | —                           |
| Average of 11 cows for one year, . . . . . |            |               |                 | 9,775 lbs.                  |
| Average of 5 cows for 4 years, . . . . .   |            |               |                 | 9,369 lbs.                  |
| 4 grades, average, . . . . .               |            |               |                 | 9,491 lbs.                  |
| 7 thoroughbreds, average, . . . . .        |            |               |                 | 9,906 lbs.                  |

The above is interesting, inasmuch as it shows not only the amount of milk yield per year, but the number of days in which each animal was in milk. He also averaged in one year from six full-bred cows and four grades, 8,740 lbs. per cow. In their native country, Villeroy reports yields of this breed from 11,000 to 13,000 lbs. per cow, and butter yield from 447 to 538 per cow. The herd of G. S. Miller of Peterboro, N. Y., averaged in five years 8,738 lbs. of milk per cow, the largest yield from one cow for one year being 14,027 lbs.

Hon. Wm. A. Russell of Lawrence, Mass., reports a cow that in 1875 gave 16,274 lbs. of milk; in 1876, 12,274 lbs.; and in 13 months from May 1, 1877, to June 1, 1878, 13,232 lbs. The Unadilla Valley Association reports a cow that gave in two years 26,905 lbs., the largest record for one year being 14,312 lbs.

It will be seen that although the milk of these cows is not as rich as some in the butter element, yet the quantity produced makes up in a great measure for this deficiency. For milk and cheese dairies these cows are much sought, but where richness of milk and cream for the table, or the manufacture of what is termed first-class "gilt-edged" butter is desired, the Jersey or Guernsey breed is usually preferred.

**Holsteins for Beef.**—Holsteins fatten quite readily, the oxen frequently attaining the weight of from twenty-five hundred to three thousand pounds, while a well fattened, good-sized cow of this breed will sometimes nearly or quite reach two thousand pounds in weight. They are, of course, not equal to the Short-Horns and Herefords in this respect, the latter being pre-eminently beef breeds, as at present bred, but it cannot be denied that they make, when well fed, excellent beef. The cattle are generally of large size at birth, weighing from seventy to one hundred and twenty pounds, and when fed according to a judicious system, thrive and increase in size rapidly, making excellent veal.

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## SWISS CATTLE.

**T**HESE excellent cattle are becoming quite popular as a dairy breed in the United States. Switzerland has long been renowned for its kine, and their product of cheese and butter, and this breed has a high reputation in many parts of Europe, especially in France, where they are much esteemed for dairy use. In their native country they have been reared and kept for centuries especially for the dairy, where they are wintered in the valleys on the coarsest food. As soon as the snow melts from the southern mountain slopes they are driven to their elevated pastures, which, as the season advances, are gradually changed for the higher ranges. Here they graze among the rocks and rugged steeps, often at an elevation of more than 7,000 feet above the level of the sea. For four months during the year they are kept on the most elevated feeding grounds, where a large number will be attended by one man, who combines in himself the office of herder and dairyman. Here they remain feeding, often at the very edge of the snow fields, until the short summer of this region is over, when they descend to the more sheltered pastures and valleys again, being driven down by the autumn storms.

Cheese is the chief dairy product, and it is said that each cow produces by the end of the season of four months, an average of 225 pounds, and that the best cheese of the country is made upon these elevated pastures, its manufacture being conducted in the most primitive manner in the lonely little chalets perched upon the mountain side.

In consequence of the surroundings and habits of these cattle, extending through so many successive generations, they have become hardy and vigorous, healthful in constitution, and active, while they are thrifty feeders, although not as particular as to the quality of their food as some races. It is, however, true of this breed as with all others, that the better the quality and quantity of food given, the better the results in milk yields.

The Swiss cattle of the plains and those near the large towns are for the most part kept confined in close, unhealthy stables. Mr. S. H. M. Byers, the United States Consul at Zurich, says of these stables:

"The extreme *warmth* of these stables, in almost every case, was as noticeable as the



SWISS BULL, "FREDERICK SCHILLER."  
(Three years old.) Imported and owned by Geo. W. Harris, Wethersfield, Conn.



simple quality of the food. Swiss cattle stalls are, almost universally, long, very low, rectangular attachments to the barns. They are always built of stone, with walls one to two feet thick. The stalls are usually ceiled overhead, and are often plastered throughout. The floors are likely to be of stone or cement, and the single oak door at the end of the rectangle is as tight-fitting and airless as the doors of the people's houses. There are no windows, unless the one or two little barred holes through the stone walls are to be called windows. There is no ventilation, and the place is very nearly dark. The hay is gotten into the little low mangers through small openings in the wall, between the heads of the cows and the hay barn. The atmosphere in these stalls is hot and horribly impure.

The stalls are clean and nice beyond comparison. They are swept and littered two and three times a day. It is their heat only and want of ventilation that are nearly unendurable. The litter or bedding is usually slough-grass, poor hay and straw, and sometimes sawdust. Cows that are kept by peasants in the neighborhood of the mountains are taken out and pastured on the high Alps during the short summer. This, however, is a comfort denied all Swiss cattle of the plains, and cattle near towns. In the stalls the cows stand in rows, with scarcely a foot of room between them; indeed they have barely room to lie down at all.

As I have already said, grass and hay usually form the only food the cows receive. In the summer the cow is fed all the fresh cut grass she will eat. In the winter, she is allowed, usually, about seven Swiss clafters of hay (a clafter measuring 216 cubic feet). This would average near to 30 pounds, or, at selling prices, about 19 cents' worth of hay to the cow, daily. In exceptional cases only are two or three cents' worth of turnips, potatoes, or shorts, added to this daily ration. There are no pasture fields, aside from the high Alps, so the cow receives her grass ready cut, and in her manger out of reach of flies."

These cattle are well adapted to hilly and mountainous districts, and wherever they have been distributed in this country, have given the best of satisfaction to their owners. Being extremely hardy, they are little affected by change of climate, and are admirably adapted to mountainous localities or such as may sufficiently approach their native habitat to require for their most profitable occupancy such a breed as this, and where one less hardy would not prove profitable. They are regarded by some as destined to be the favorite dairy cow of the future.

**Description.**—There are different races of cattle in Switzerland peculiar to certain localities. These races seem to be modifications to a greater or less degree of the principal breed, the — "brown Switzer," — which we describe, and which is superior to all others in that country for milk production. During the past few years there has been a marked improvement in the Swiss cows. Having formerly been bred solely for milk, no attention whatever was paid to beauty of form or color in breeding. The old-style cow of this breed therefore had a large, coarse head, with a receding forehead, high coarse shoulders, coarse skin, and a large frame with an undue preponderance of bone.

At present, however, the Swiss cow is an animal of very different type, and while it may differ somewhat in fineness from the small-boned Jersey and some other breeds, yet the change from the former type is a marked one, and has also been accompanied with improvement in milk production; so that the Swiss cow of to-day, as a milker, may be classed among the best performing races known to the dairymen.

The Swiss cattle are large and well formed, the usual weight of the cows being about 1,200 to 1,300 pounds, exceptional weight being 1,500 pounds. Mature bulls range from 2,000 to 2,700 pounds. Those kept in the higher Alps, where the herbage is scanty, generally average about 900 pounds. In color they vary from a light to a dark chestnut brown; the lighter being denominated by some writers as a "mouse color." The light shade is particularly observable in a narrow line along the back, in the inside of the ears, and in tufts of hair between the horns. The horns are rather short, of smooth texture, and tipped with

black. The nose is black, and is surrounded by a meal-colored band; a yellow strip extending from the middle of the lower lip to the upper lip, and up the sides of the nostrils. The mouth and tongue are generally dark-gray or black; the switch and hoofs are also black; udder well developed, white, and smooth. The shoulders are large, the thighs wide apart, hind quarters heavy, and the hind legs straight. The disposition is extremely kind and docile. Their marks are very persistent, a fact which denotes the purity of the breed. Other races, such as the Fleck, and the light spotted cow of the Simmenthal, were formerly held in high esteem, but the brown Switzer is generally considered superior to all other Swiss breeds for dairy purposes.

**Swiss Cows for the Dairy.**—That the Swiss cow possesses valuable dairy qualities cannot be denied, as has been shown by repeated tests in this country by competent and reliable persons. Mr. D. G. Roberts of Pittsfield, Mass., an ardent advocate of this cow, and one who places a high estimate upon her dairy characteristics, says: "She is a coarse necked, heavy bodied cow, and knocks all my theories higher than a kite," her chief attraction seeming to be in good works at the pail, rather than in any external beauty. The Swiss cow "Bessie," owned by this gentleman, has the following record, as given by him: Yield of milk from November 1st to December 31st of the following year, 10,905 pounds; yield of butter for the same time, 573 pounds. She dropped her calf August 11th of that year, and was not dry during the fourteen months of the test. From the 1st to the 13th of August the milk was not weighed. The feed of this cow was roots, meal, and bran in winter, the quantity not being stated; grass and fodder corn were fed in summer. He also says that he tested her with a Jersey cow for three months, and that under the same treatment and on the same feed, in quantity and quality, the Swiss cow produced an average record of fifty-five pounds of butter per month, and the Jersey cow forty-five pounds. In the month of February of the same year, the Swiss cow made fifty-seven pounds of butter, and the Jersey forty-five; in March, the Swiss cow made sixty-seven, and the Jersey fifty-two pounds. The feed was good hay, corn fodder, roots, and corn meal. "Geneva," a cow of this breed, imported by Mr. D. G. Aldrich of Worcester, Mass., is stated by that gentleman to have given thirty quarts of milk in a day, averaging for twelve days  $26\frac{1}{2}$  quarts daily, and has yielded three pounds of butter in twenty-four hours milking. If the above records, as given by the owner of these cows, can be taken as a fair standard of the breed, it certainly merits a place among the best of our dairy stock, as far as the production of milk and butter are concerned. Mr. Byers, the authority previously quoted, gives, in his report on the Swiss milk industry, the following statement with respect to the dairy qualities of this breed of cows:

"Not far away from Einsiedeln I found a small herd of cows kept by a Mr. S., who is a very exceptional 'feeder' for a Swiss. He adds bran, shorts, and vegetables to his hay, and has an extraordinary pride in his cows. For fifty years Mr. S. has been keeping cows on this same farm. Every detail of his establishment was given me, copied from carefully kept records. The average results were not materially different from the average of other small select herds. His cows give 10 litres of milk each daily, year in and year out. He has, what is a great exception, well ventilated cow stalls. He gives the usual allowance of hay, viz., 30 pounds daily to the cow, and a spoonful of salt every other day. All his milk goes to neighboring factories, and is paid for at the stall when milked, at four cents a quart. His fine herd averages about 1,300 to 1,400 pounds in weight. There are exceptionally good milkers among them. Some of the five and six years old give fifteen quarts a day for one year after calving. One cow gave eighteen quarts a day two months after calving. Another cow, eight years old, did about as well. Another gave twenty-one quarts of milk for three months after calving, and an average of twelve quarts during the remainder of the year. She produced twenty-one pounds of butter per week for three months, and

extraordinary amounts the year through. It is noticeable that this cow received almost no artificial food. She is also a rare exception, even for the Switzer breed.

Perhaps no more reliable statistics as to the milk production exist than are kept by the Anglo-Swiss Condensed Milk Company of Cham, Switzerland. This is, I believe, the largest and most successful concern of the kind in the world. It uses the milk of not less than five to six thousand cows at the principal factory in Switzerland, and of as many more at the company's condensing establishments in England.

The company's director, Mr. Geo. H. Page (an American), feeds, as private property, the very finest herd of the brown 'Switzer' cows I have found in the country, and it is principally this herd of cows, and not the milk condensing factory, I purpose reporting briefly at present. Mr. Page keeps his herd of thirty cows in a large rectangular house, with brick walls and tile roof. The very broad ceiling is unsupported, except by the outer walls. It is very high, and the whole immense room where the herd stands is plastered throughout, and furnished with every modern improvement as to mangers, floors, ventilation, etc. This fine herd ranges in age from three to five years, few being over three years, and the cows average in weight 1,400 English pounds. One of them, a four years old (an exception of course) weighs 1,810 English pounds.

The cows of this herd are perhaps in all respects above the average of the 'Switzers,' as they were mostly choice selections, and paid for accordingly, at prices reaching in single cases \$200 to \$240.

Mr. Page feeds *only grass and hay*, summer and winter, and that is worth bearing in mind. His cows are taken out to exercise daily, but never graze. Twenty-six of these three-year-old heifers produced in April, May, and June (after first calf) 28,076 litres of milk, or twelve quarts per cow daily—a large average when it is remembered that it includes almost every cow in the herd, and that none were at the best milking age. Mr. Page counts on these twenty-six cows averaging fifteen litres daily this coming year. Three of the 2½-year-old heifers gave at highest point 19½ quarts daily, and averaged 10 quarts the year through. Three others, after second calf, gave 24 quarts daily for three months, and maintained a high average throughout the year.

Mr. Page's advice to those who would buy Swiss cows for importation would be to buy for 'in-breeding' only, and not for crossing. He retains only the very best calves, perhaps one in six, and sells the remainder to the butchers. It is worthy of note here that Italy and other States are rapidly buying up choice specimens of Swiss cows for exportation, so that cattle growing here bids fair to assume larger and more profitable proportions.

The milk condensing company of Cham pays at present to farmers for many miles around an average of 13½ centimes, and the farmers, with their dear land and their dear cows, are apparently satisfied. The reports of the milk and butter of the many thousands of cows contributing to the condensing factory at Cham are most interesting. During the year 1881, the condensers used the milk of between 5,000 and 6,000 *grass and hay-fed cows*. They were milked about nine months, and produced on an average 5,315 *pounds* of milk per cow; this is 19.7 pounds, or 9.8 quarts of milk per cow daily for the milking season."

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## KERRY CATTLE.

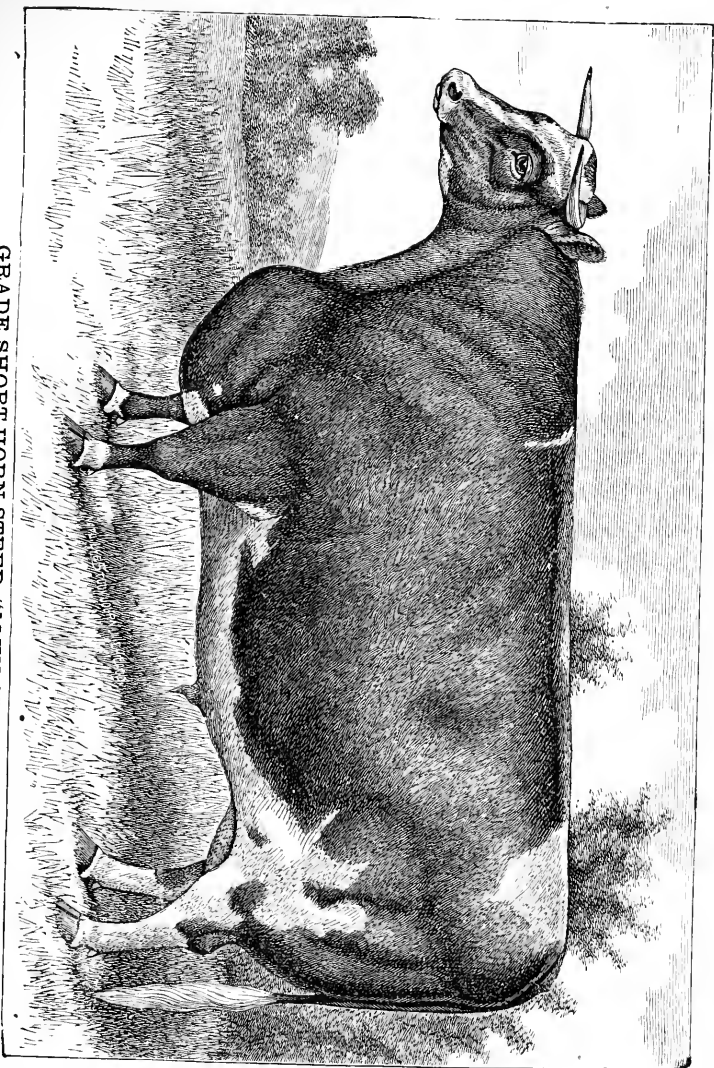
**T**HIS breed originated in the county of Kerry, Ireland. As they have some points which may be interesting to the farmer to examine, we submit the following concerning them from the pen of an English writer, who, as it will appear, is to some extent a breeder also.

**Description.**—"The characteristic points of the breed are unmistakably well marked. The size is small. The legs, in most cases, are very short in proportion to the size of the body. The head is somewhat small, though the muzzle is rather long and clean. The lips are thin. The expression of the countenance is pleasing, and the eye is particularly clear and fairly prominent. A symptom which is most indicative of purity of the breed is the 'turn-up' of the horn, which is of medium length. Occasionally, however, the horn will, after turning up, turn backwards. The nicety of the horn and the manner in which it is set on adds immensely to the style. The neck is not massive at the juncture with the head, but it thickens gradually, and affords reasonable covering to the shoulders. The latter are flat and thin. The dorsal vertebrae rise more than in other cattle, which sometimes gives the back an irregular appearance. The ribs spring well, especially the last, or those approaching the hip; this makes the body very compact. The loins are of medium width, and the hip not prominent. The distance between the hip and the setting on of the tail is not considerable: the latter hangs neatly, and is well concealed by the adjoining bones. The chest is full and deep, and the hind-quarters long, but rather light. The favorite color is black; though black-and-white, brown, and red are by no means uncommon. The coat is invariably fine and thick, and the hide elastic and mellow, showing great capacity for the production of flesh and fat.

The disposition to fatten is likewise a remarkable peculiarity in the breed; it must, however, be understood that they take a pretty long time to come to full maturity. At the age of three or four years we find them in the market, killing about 3 cwt. of beef; though, as a rule, the fattening as distinct from dairying, is not carried out to any appreciable extent. The prevailing custom is to milk for some years, and, subsequently endeavor to put into condition for the butcher. Very few male animals are reared, except those intended for breeding. If a person were to travel the entire length of the 'kingdom of Kerry,' he would probably not see a dozen bullocks of the native race. In fattening, the animals thrive with great rapidity on artificial food. The beef is well marbled, and for flavor and tenderness is not excelled by that of any other breed. We have known some of the nobility to put themselves to much inconvenience in order to secure a round of well-fed Kerry beef for special occasions. Bearing all this in mind, it is surprising that more attention is not bestowed on the propagation of the breed. Some years ago it was suggested that a society or company should be formed, with the object of improving and spreading the animals in suitable localities; but the suggestion has not yet been acted upon. Should such a body be formed, the breed could, unquestionably, be carried to a very high state of perfection.

It is, as already observed, the hardy constitution of the Kerry that most enhances its value; for dairy purposes especially a remunerative yield is obtained on what would be to other animals 'starvation fare.' In the depth of the winter season I have not only known the animals to live jumping from rock to rock, and from cliff to cliff, picking a coarse, scanty bite from amidst the snow-clad mountains, but, with very small additional keep at the farm steading, whither they come to be milked morning and evening, to actually thrive under the circumstances. The hair is thick, but fine and long—provision of nature typical of cold latitudes.

What, however, is far more singular in the constitution of the breed, is the readiness with which it adapts itself to circumstances of a wholly reverse character. In acclimating breeds of cattle, sheep, or pigs, the transition must be gradual; but with the Kerry we have had



**GRADE SHORT-HORN STEER, "JOHN SHERMAN."**  
Winner of Grand Sweepstake Prize for best animal of any age or breed. Property of J. D. Gillette, Elkhart, Ill.



it suddenly and indiscriminately transferred from its home in the mountains to the richest grazing valleys which our island can boast of without experiencing the slightest change as regards health. Not alone this, but we have seen the beasts ushered at once into the dairy sheds, and there confined for years in the closest bondage without any apparent effect on the constitution.

**Dairy Properties.**—As regards the milking properties, they have been partially indicated in the foregoing remarks. The udder is extremely well formed, and the milk veins highly developed. I have had Kerries that milked sixteen quarts per day for a long period of the summer, although fourteen or fifteen quarts for three months after calving is a pretty general yield where a good system of feeding is adopted. Twelve quarts must be looked upon as a good average for an entire season; in remote and coarse districts, where the beasts have to maintain themselves on inferior herbage, nine quarts is probably nearer the mark. The milk largely abounds in cream, and is nicely flavored. The butter is rich, and for color and taste it stands unrivalled.

One or two Kerries in the herd are sufficient to give the entire yield of butter a most agreeable color and flavor; it is principally for this reason that we never like to be without a few of these animals. Whereas it will require from ten to twelve quarts of the milk of other breeds to produce one pound of butter, we have frequently realized the same amount from eight or nine quarts of milk of the Kerry; of course the general feature is more or less shared in, that the proportion of butter is regulated in accordance with the feeding."

Another writer of the *London Live Stock Journal* says: "I have before me an instance of an Lilliputian Kerry having produced 13 lbs. of butter per week, a marvelous yield, considering her size, for the Kerry cow is usually much smaller than the Jersey. But the extraordinary statement about this is, that three pints of cream made one pound and four and a half ounces of butter. Suppose the cream to be 25 per cent. of milk, which is not uncommon, there would be six quarts of the latter. This would be at the rate of one pound of butter to a fraction over four and a half quarts of milk."

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## SHETLAND CATTLE.

**T**HESE are the smallest cattle in the world, and compare with the common-sized breeds about as the Shetland pony does with the horse of ordinary dimensions. When fully fattened, the carcass of a Shetland cow is said to scarcely exceed in weight that of a long-wooled wether. An English writer says of them: "These little creatures are excellent milkers in proportion to their size; they are very hardy, are contented with the scantiest pasturage, come early to maturity, are easily fattened, and their beef surpasses that of all other breeds for tenderness and delicacy of flavor. The diminutive cows of this breed are not unfrequently coupled with the Short-Horn bulls, and the progeny from such apparently preposterous unions not only possess admirable fattening qualities, but approximate in bulk to their sizes. These curious and handsome little creatures, apparently of Scandinavian origin, are so peculiarly fitted to the circumstances of their bleak and stormy habitat, that the utmost pains should be taken to preserve the breed in purity, and to improve it by judicious treatment."

The importation of these cattle into this country could not be recommended under any circumstances whatever, except as curiosities, but in their own native land they are exceedingly useful, since, like the Shetland pony, they will subsist on the most scanty fare, and will thrive where almost any other breed could scarcely exist.

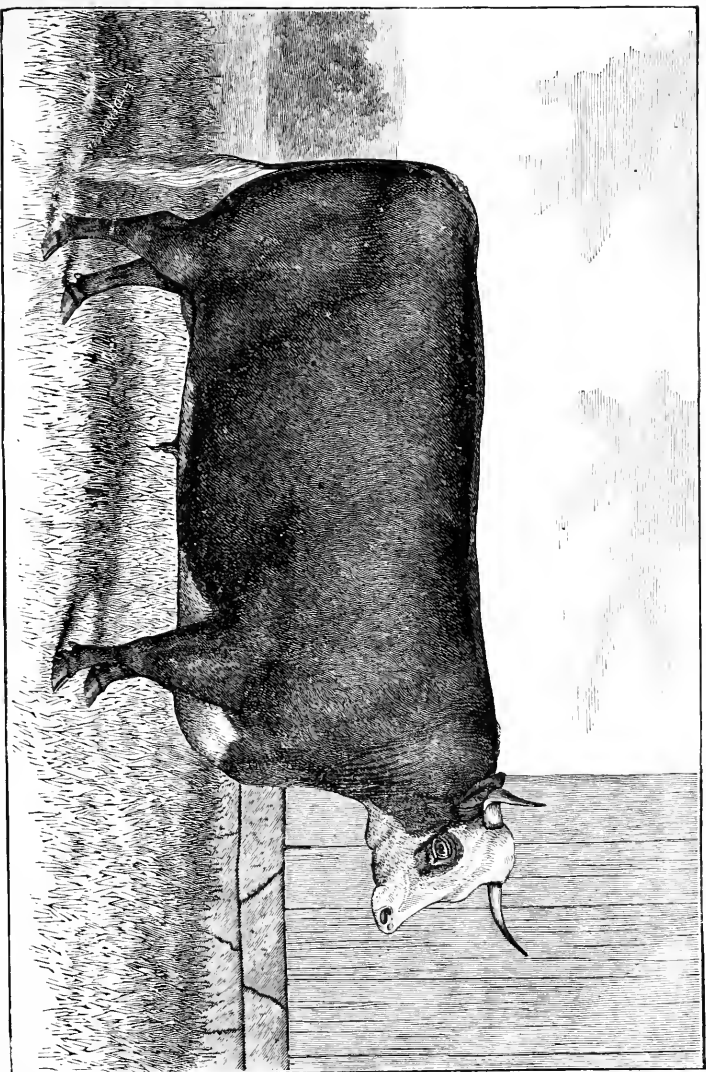
**Grades of Various Breeds.**—The term breed, in its proper meaning, applies only to animals of the same species, possessing, besides the general characteristics of that species, other qualities or characteristics peculiar to themselves, and which they transmit with certainty to their offspring. When these qualities have thus become permanently fixed, then the claim may be well founded that a breed has been established. Grade cattle may be defined as the progeny of any pure breed crossed upon the native stock of the country, or upon any cattle whatever not of its own breed. Hence we have grades of the Short-Horn or Hereford breeds with the native cattle, that make excellent beef; the Holstein, Jersey, Guernsey, or Ayrshire for improving the common stock for the dairy; the Devons or Herefords for working cattle; the cross between the Short-Horns and Herefords, etc. Grade is of course a very indefinite term, since it includes the first cross as well as the fourth or fifth, and is also applied to a cross between pure-bred breeds of different kinds, and pure-bred animals and native stock; neither does it indicate how near the grade approaches the thoroughbred. To aid in this respect most breeders and writers have adopted the following progressive scale:

|                    |               |                               |
|--------------------|---------------|-------------------------------|
| 1st cross produces | $\frac{1}{2}$ | or 50 per cent. thoroughbred. |
| 2d " "             | $\frac{3}{4}$ | or 75 " "                     |
| 3d " "             | $\frac{7}{8}$ | or 87.5 " "                   |
| 4th " "            | 15-16         | or 93.75 " "                  |
| 5th " "            | 31-32         | or 96.875 " "                 |
| 6th " "            | 63-64         | or 98.437 " "                 |
| 7th " "            | 127-128       | or 99.218 " "                 |
| 8th " "            | 255-256       | or 99.609 " "                 |

Flourens arrived at the opinion, after experimenting by crossing the dog and jackal, that the fourth class was practically thoroughbred, the fourth generation of these hybrids, when the dog was the male parent, not being distinguished from the dog, while the fourth cross in the other direction could not be distinguished from the jackal. While for practical purposes, such as the production of beef, a fourth, fifth, or sixth cross of a pure-bred male of the best beef breeds, if properly managed, may be equal to what are termed thoroughbreds of that breed, still, for breeding purposes, such a grade would be very inferior to the pure-bred animal.

The more pure blood the animal possesses, or the higher the grade, the better of course will be the animal, other conditions being equal. When the farmer is not able to purchase pure-bred stock, the next best thing will be to procure a thoroughbred bull of the breed that seems best adapted to his locality, circumstances, and use, and grade up the common stock, or others that may seem best adapted for a basis, always making a selection of the best individuals of his herd for this purpose. By this means he will in a comparatively few years greatly improve his cattle, and bring them to twice their original value. We have known of dairymen more than doubling the product of their cows in this way. As previously stated, for many of the practical purposes, such as dairy products or beef, we have known individuals of the higher grades that were fully equal to the pure-bred animals, in quality and amount produced; but for breeding purposes, of course, a grade cannot be depended upon to reproduce the characteristics of a breed, since there is that constant tendency to revert to the original or unimproved type, which is seen in all animals and plants. Only pure-bred animals can be depended upon with any certainty for perpetuating the qualities that characterize them as an established breed.

What is true of breeds is likewise applicable to grades with respect to their adaptation to the wants of the farmer, the climate, soil, and other conditions. In the vicinity of large cities, where immense quantities of fresh milk are consumed, these breeds or their grades are most used for furnishing the supply which produce large quantities of milk, such as the Dutch, or the Ayrshires, the grade produced partaking more or less of the characteristics of the breed.



GRADE HEREFORD STEER "CONQUEROR."  
Winner of Sweepstakes for Two-Year Olds, at Fat Stock Show, Chicago, 1880. Property of T. L. Miller, Beecher, Ill.



In New England, the middle, and many of the northern states, as well as other dairying sections, the milk or dairy breeds and their grades predominate, the old style, or unimproved Short-Horn, forming in many cases the basis of the stock to be graded up or worked upon. In nearly all the more settled grazing regions of the country, the Short-Horns have for some time predominated, since their large size, fine, compact, and massive forms, early maturity, and the readiness with which they lay on fat, render them very profitable for the production of a superior quality of beef; but within a few years the merits of the Herefords for beef production have been more fully appreciated in this country, and they at present seem to be competing with the Short-Horns for the palm of excellence. Since the year of 1876 more especial pains have been taken towards improving the cattle of the great western plains, and large numbers of Short Horn and Hereford bulls have been transported to those immense grazing regions that lie east of the Rocky Mountains, and the valleys that lie interspersed within them, for the purpose of producing grades for the great markets of this country and Europe.

Grade Short-Horns and Herefords have been known to attain a weight of 3,500 pounds live weight, and it is said that at the stock yards in Chicago it is not uncommon to find many that will average from 1,800 to 2,000 pounds.

The grade Hereford Steer "Conqueror," of which we give an illustration, weighed when twenty-seven months old 1,845 pounds. The weight of the grade Devon Steer, "Jim Lockwood," when three years and five months old was 1,649, having made an average daily gain from birth, of about one and one-fourth pounds.

**Native Cattle.**—The genus *Bos* cannot properly be said to be a native of America. The wild cattle of the vast plains of South America, Texas, Mexico, and other portions of this continent, do not owe their origin to this country, but are descended from cattle brought here by the early Spanish adventurers, some of which, escaping from domestication, became wild, and in time increased to such an extent that in South America innumerable numbers of them have been slain simply for their hides and tallow. The buffaloes seem to be the only original cattle of this country, and the so-called "native cattle" of the older settled portions, are the descendants of those brought over by the early colonists from time to time, as settlements were made. Our present native or common cattle are therefore a mixture of various breeds that have been imported at different times.

The early settlers, of course, took with them the cattle common at the points from which they sailed, and on arriving at this country, had too much to do in establishing for themselves a home in the wilderness, clearing the lands, and defending themselves from the Indians, to pay much attention to the breeding of their cattle. During the past century, more especially during the last half, greater attention has been paid to breeding cattle in this country than formerly, and crosses have been made with the improved types of the better breeds of Europe, especially England, that have greatly improved the common stock. It is probable that the first importations of cattle to this country were those taken to Virginia previous to 1609, although nothing definite is known respecting the exact date of their arrival. History states that several cows were taken to Virginia from the West Indies in 1610, and during the next year no less than one hundred arrived there from abroad. The earliest importation of cattle into New England was doubtless in 1624 by the Plymouth Colony. In 1631 they are mentioned in the old records at Plymouth, as having greatly increased. It seems that a division of these cattle took place in 1627, three years after their arrival here, one or two being described on the records as black, or black and white; others as brindle, which proves that there was no uniformity of color among them. Shortly afterward a large number of cattle were brought over from England for the settlers at Salem. In 1625 the first importation was made into New York from Holland, by the Dutch West India Company, and the foundation was then and there laid for a valuable race of animals, which have been greatly

improved by subsequent importation from that country and England. In 1627 cattle were brought to the settlement on the Delaware from Sweden, by the Swedish West India Company. In 1631, 1632, and 1633 a number of importations were made into New Hampshire by Capt. John Mason, who, with Gorges, procured the patent of extensive tracts of land in the vicinity of the Piscataqua River. These Danish cattle are described as large, coarse, and of a yellow color. Many of their descendants, mixed with other breeds, though often ungainly and ill-shaped, have been remarkably good milkers, especially as to quantity. It will thus be seen that the native stock is a mixture of all breeds and races. Laurence, in his interesting work entitled, "A General Treatise on Cattle, the Ox, Sheep, and Swine," published as long ago as 1805, gives the following list of English breeds of that time:

"These are the original or established species or breeds of cattle in Britain, with their permanent varieties, as they are found in the beginning of the nineteenth century: The Devons—from these have been derived the Hereford, Old Gloucester Reds, and Sussex; the Kentish Homebreds; the Welsh Mountain and Lowland cattle; Isle of Anglesey; the Lancashire, or Northwestern, and Midland County Long-horns; the Shropshire Wide-horns; the Northern Short-horns, or Teeswater, Lincoln, and Holderness, or Yorkshire Short-horns; the Northern Half-Long-horns; the Polled; the Norfolk Homebreds; the Suffolk Duns; the Scottish Island, Mountain, and Lowland cattle; the Wild cattle of England, the Alderney, and Irish cattle."

Which of these different breeds or races were first imported to this country, or predominated with the early settlers, is not definitely known, and will probably ever remain a matter of conjecture.

The Spanish types have been preserved in South America, and in all the country south of Texas. In the northern portion of the United States will now be found the better breeds and their grades, such as the Short-Horn, Hereford, Devon, Ayrshire, Dutch, Jersey, etc., the different breeds prevailing according to the locality. Although the common or native cattle of the country are of course very much inferior to breeds of pure blood, individuals will be occasionally found among them that possess qualities of superior value, and many of them are capable of great and rapid improvement. The following shows what may be accomplished with only the native stock, by care and judicious selection. In 1845 a man began dairy farming upon the Schohairiekill, in Greene County, New York. He was not a farmer, but, on the contrary, had been a tanner in the county for twenty years. Having cleared the land of its hemlock, he found it formed a fine sod; consequently when his tannery closed for lack of bark, he stocked his land with milch cows, and began to make butter. For ten years he followed the old beaten track, obtaining an average of about a hundred and twenty-five pounds of butter a year from each of his fifty cows. Then it occurred to him that this was not enough, and he proceeded systematically to improve his herd, keeping an exact account with each cow, and of his whole farming operations. He had only the "native" stock of the country. The record of the herd begins in 1856, and closes with 1863, keeping up the number of fifty cows, and breeding only for the dairy, from the best animals for this purpose that he could select from among them. The main point is not the amount produced, but the steady increase, under this management, of their average product year after year, as shown by the record:

| Years.                 | 1856. | 1857. | 1858. | 1859. | 1860. | 1861. | 1862. | 1863. |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Pounds butter per cow, | 125   | 136   | 161   | 166   | 183   | 217   | 223   | 225   |

In commenting upon this case, a recent writer says: "In eight years this man had entirely changed his animals, although keeping the same stock, improving it by good management and without expense. The result was an increased product of a hundred pounds of butter a year to each cow, three-quarters of which he reckoned clear gain. It was a most common-sense, practical, business-like operation. Any farmer can do the like.

On a high bluff, overlooking the village of Prattsville and the farm where this work was done, the profile of Col. Zadock Pratt stands out in bold relief, cut on the solid rock,—a fitting monument to one of the first men who systematically undertook, in an inexpensive way, the improvement of the common milch stock of America, and left an authentic record of his doings as a guide and encouragement to others.

Some men feel satisfied, if, on keeping a record of the product of the whole herd, it shows a good annual average per cow. A very common mistake is made in dividing the gross product of the herd by the average number of cows in milk, instead of the whole number kept. It should be remembered that every cow has to be fed twelve months in the year, and every twelve months lessens her period of usefulness by a year; therefore what is wanted is not what the animal will yield while in milk, but what she produces during every calendar year.

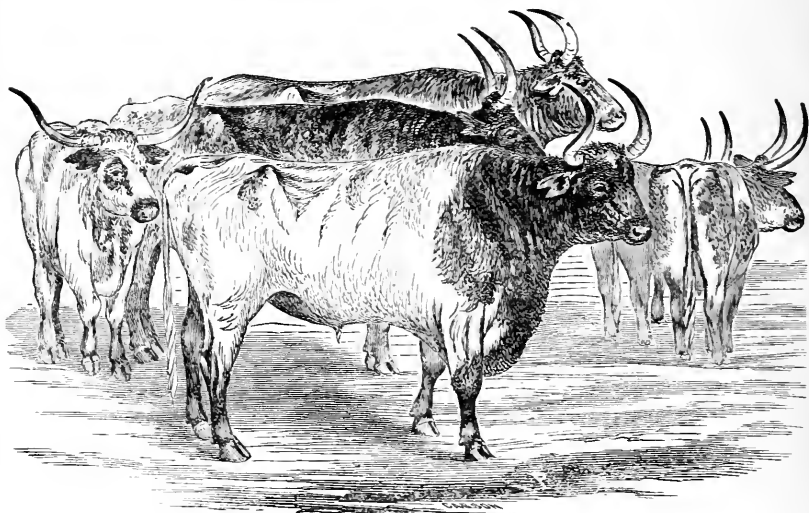
Still further: as to a record, milk-production alone is not sufficient; quality as well as quantity must be considered in the question of profit, especially if butter-making be the object. The only sure way is to test the milk of every cow separately, often enough to determine its butter-making capacity. For this purpose the cream-gauge is insufficient. There is no fixed relation between the percentage of cream from a certain cow's milk and the percentage of butter. Cows differ as much in their cream as in their milk. The weighed butter is the test. But if, by the record, you know how much milk a cow gives each month, and once a month ascertain how many pounds of her milk are required to make a pound of butter, you have a correct guide to the value of the animal."

If such results can be attained by skillful management with only the native stock, what may not be accomplished with the improved and valuable breeds that (especially for grading) are within the means of almost every farmer of the country. Here is certainly an example that speaks volumes of truth and encouragement in behalf of a systematic and judicious management in the breeding and care of cattle. By consulting various authorities it is found that in the year 1710 the average weight of Smithfield beef cattle was three hundred and seventy pounds; and in 1794 the average weight of cattle in the English market was four hundred and sixty-two pounds, this being an increase of twenty-five per cent. during the preceding thirty years. Very few animals were fatted at that period under five years of age, they being of slow growth and maturity. When we compare these with some of the present improved breeds, with respect to size, weight, rapidity of growth, maturity and quality of beef product, the manifest difference in favor of the latter is great and the improvements brought about by careful breeding and judicious management is truly wonderful.

**Texan Cattle.**—These cattle are of Spanish origin, and were introduced into Mexico (of which Texas was then a part) about the year 1500, being brought to this continent by the early adventurers. They are supposed to have been of the same race as those kept for many centuries by the Moors on the plains of Andalusia, and their successors, the Castilians, although we have no positive proof of this fact.

These cattle in time covered the vast grazing plains of Mexico, Texas, and California, becoming, to all appearances, wild cattle, feeding upon the abundant herbage the climate and soil of those regions afforded. Immense numbers of them have been killed annually until within a few years, simply for their hides and tallow, notwithstanding they had increased to the extent that within a few years their estimated number in Texas alone was over four millions, and at that time constituted about one-seventh of the cattle of the United States and territories. They congregate in large herds and range and propagate with little care, being known to their owners only by the marks or brands that are put upon them. They are gathered once a year for identification, when the calves are castrated and branded, while those fit for beef are selected and driven to market. They are impatient of restraint, and having led a wild, roving life, never become really domesticated. When from five to seven

years of age, they average about a thousand pounds live weight, but when fed on corn for some months they will reach an average of 1,200 pounds, with perhaps from 600 to 700 pounds of marketable beef, as weighed from the butcher's block. These cattle, of which the cut is a good illustration, are of almost every color ever represented in a bovine animal; they are tall, lank, and bony, with coarse heads and exceedingly long horns, flat-sided, swayed in the back, with high flanks, narrow hips and quarters, and long and coarse legs. As beef animals, they have a large amount of offal in proportion to their flesh. The cows give only sufficient milk for the nourishment of their offspring, and are nearly as large as the oxen.

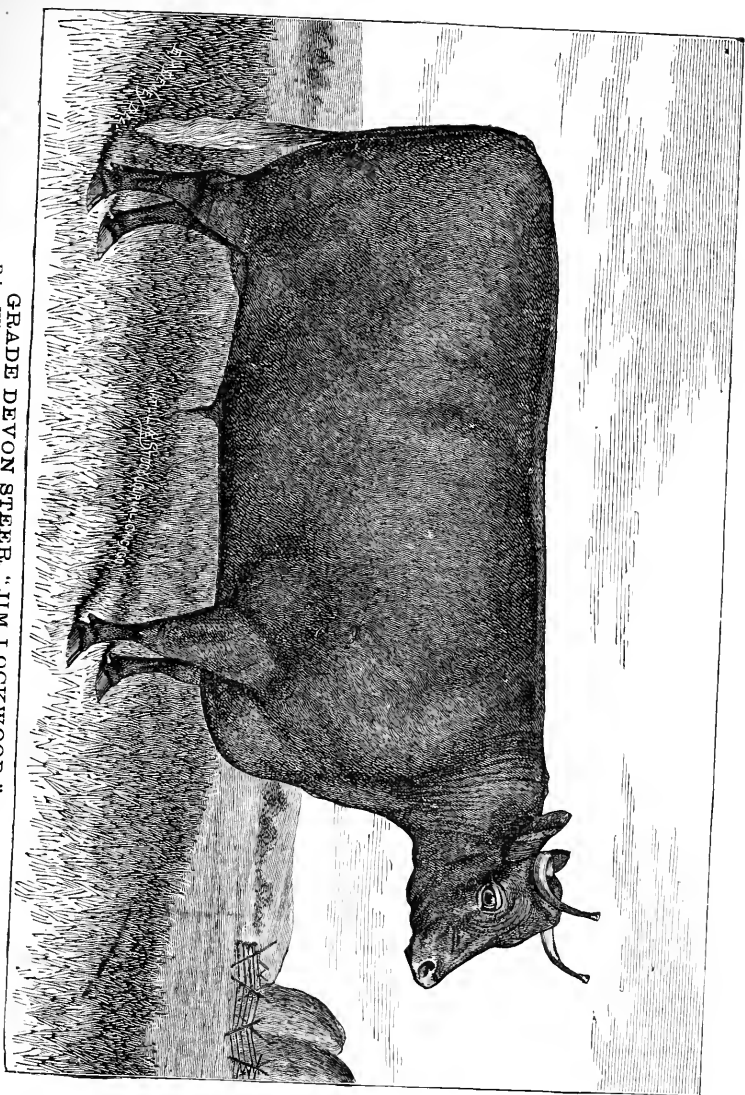


GROUP OF TEXAS CATTLE

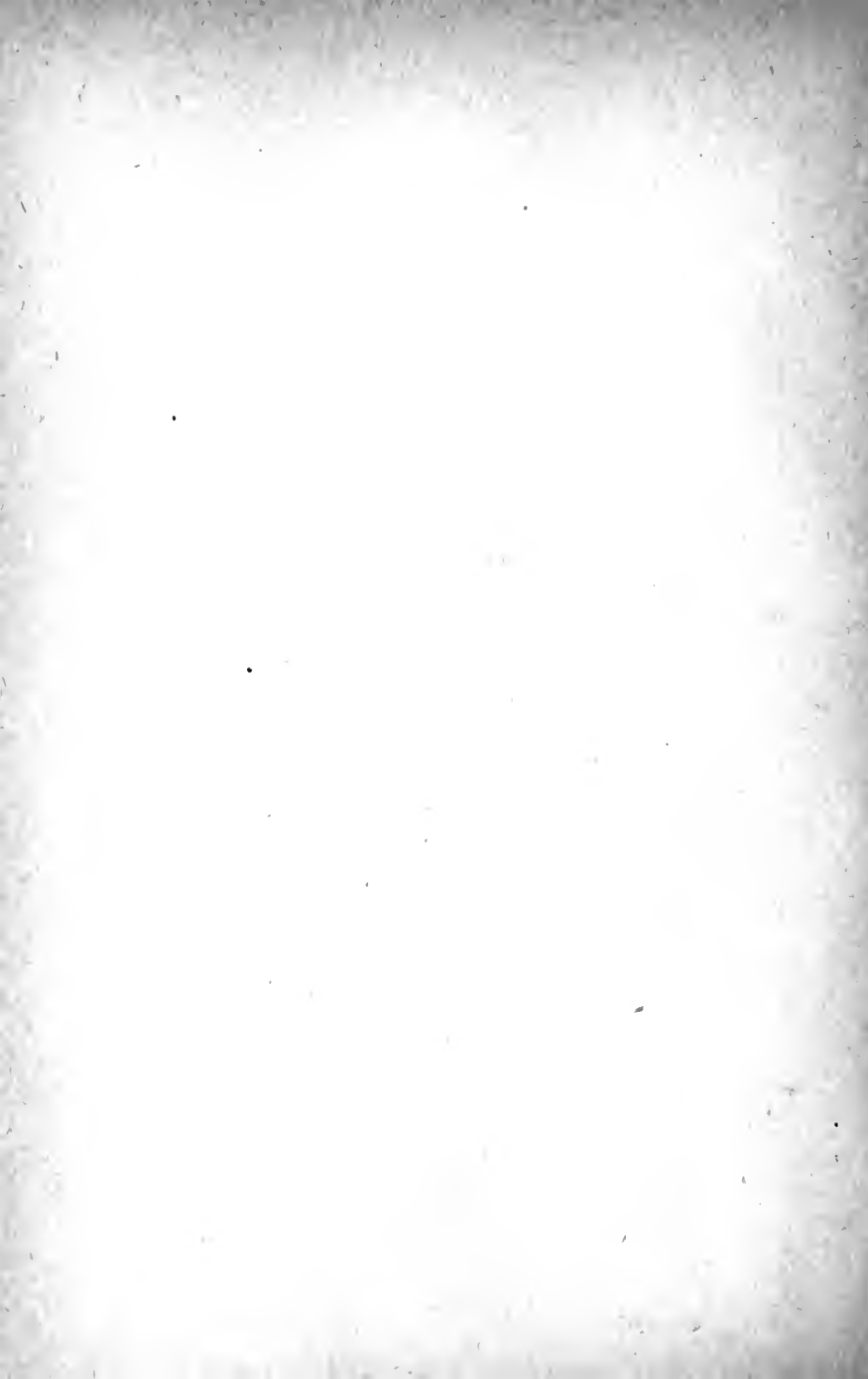
These cattle have aided much in supplying the beef markets of the country, but for a few years past the typical Texan steer has become less common in the Western stock yards, having been improved to a considerable extent by the importations of pure-bred bulls of the best beef breeds, such as the Short-horns and Herefords. The change brought about by this means is more and more apparent in the improved form, weight, fattening qualities, and early maturity of these half-wild animals that are now furnished for the beef markets.

By comparing the cut of Texan cattle, inserted above, with those of the fine pure-bred animals of the present time, we have a good illustration of what has been accomplished by the intelligent breeder, as well as a striking contrast between a poor and unprofitable animal and a valuable one, the breeding and keeping of which is a source of pleasure as well as profit to his owner.

**Acclimation of Thoroughbred Cattle in Texas.**—The introduction of thoroughbred cattle into Texas has been attended with a serious barrier in the form of the disease known by the various names of Texas, Spanish, gastric or acclimating fever. This is a malignant, contagious disease, originating in the lowlands of Texas and Mexico, and is said to resemble, in its effects on the system, the rinderpest of Asiatic Russia. It is, however, less destructive and contagious than the latter, since it will not be communicated to cattle



GRADE DEVON STEER, "JIM LOCKWOOD,"  
Prize Winner at Fat-Stock Show. Property of Gen. L. F. Ross, Avon, Ill.



from one pasture to another if they are kept separate. This disease is communicated by cattle traveling over the feeding grounds or roads that have been traversed by infected cattle, but it is destroyed by the first frost that occurs.

The best method of acclimating bulls in Texas that have been taken from the North, is to select the most healthy calves, those of stout, robust frames, and the offspring of dams and sires of strong constitution. Those dropped in the early spring are recommended as most suitable for transportation about the first of December, when the danger of the Texan fever is passed.

These should be fed liberally with milk until September, and then be allowed a suitable supply of wheat bran, crushed oats, corn leaves, grass or hay, with access at all times to plenty of pure water to drink. It is also well to have them made gentle by frequent handling, and broken to the halter, as they can by this means be so much more easily managed when they arrive at their destination. A writer in Texas gives the following directions in the *National Live Stock Journal* respecting the transportation and acclimation of calves thus imported:

"The cars for transportation should be well bedded, and food for the entire trip transported with the stock. Arrangements should also be made for a through trip when starting. Food, water, and careful watching by the herdsmen will land them at the place of disembarkation but little damaged by the trip. Care should be taken not to crowd too many in one car. Thirty head can be taken if they are properly cared for, yet twenty-five head would do much better. The calves designed for shipment in one car, if more than one is to be sent, should be permitted to run together for some time previous to starting. After reaching the terminus of their journey by rail, a week's rest, in dry lots, should be granted them, with the same kind of food as before shipment. When taken any distance, slow and easy travel should be given them. If either costiveness or its opposite is exhibited, simple remedies should be given to prevent the too active purging or relieve the constipation. The preparation for their reception at their Texas home should have been completed in advance of their arrival; and in addition to a supply of corn, oats, and wheat bran, as referred to above, pure running water and free access to a growing oats or barley patch, which should have been sowed in early autumn for their benefit, should be allowed. Suitable protection must be provided to guard them from the cold blasts of our 'northerners,' giving also prompt attention to any symptoms of fever, as follows: when the animal is discovered ailing, one table-spoonful of powdered charcoal, one tea-spoonful of powdered ginger, and, in about one hour, one quart of marsh-mallow infusion—*i. e.*, boil the mallow in hot water until you obtain a strong decoction—and one quart of camomile tea. If marsh-mallows are not to be had, give large doses of saltpetre; and if the animal is not relieved after eight or ten hours, repeat the above. Give plenty of green food as the appetite returns. This treatment has been quite effective; fully 95 per cent. of cases thus treated have recovered. The symptoms, when taken, are restlessness, dull eyes, and moping movements, with an inclination for solitude, constant straining to make urine, and the little voided of bad odor, and red in color. The bowels are either very costive or much given to scouring.

The most important discovery I have yet made concerning the future of thoroughbred cattle in Texas, is this: they can, under proper restrictions, be imported and acclimated at not exceeding a loss of ten per cent. This can be accomplished by following the course that we here lay down.

If December and January are passed without fever, you can feel safe from its ravages until the rains of spring, followed by the heat of June, when the ticks and vermin menace them. Then avoid exposing them to either rain or sun, and destroy the vermin by a free use of coal oil and lard, using two parts of the latter to one of the former. If only spring calves are brought, there will be less of fever than if older animals were brought. Too

many who bring young stock to Texas stint and half starve them, thinking that to keep them in good growing condition increases the chances of disease. My observation teaches the reverse to be true. To secure a complete development of bone, flesh, growth, and early, profitable maturity, a calf must have generous treatment—plenty of nutritious food, good water, and kind treatment. I have heard men complain that Texas Short-Horns were not growthy and handsome, like those exhibited at Northern fairs. The reason for the dissimilarity was readily found, on investigation, to be that the one had excellent feeding and grooming, while the other, in addition to a long winter, starvation and acclimation, with a spring and summer with rain and hot sun, had his vitality almost destroyed by ticks, lice, and vermin. Cattle from the North cannot be acclimated unless generous food, comfortable quarters, and kind treatment are given to them during their first year in Texas; and unless this treatment be kept up, they are worthless when acclimated."

It is also recommended by the above authority that no animal should be transported to Texas for this purpose that is over eight months old, and an imported calf should not be used freely for breeding purposes, until he is at least twenty months old; by such judicious management he may be useful for many years.

**What Constitutes a Good Bovine Animal.**—In considering this subject, the objective point, or the use to which the animal is to be appropriated, should receive the first attention. It should be the aim of every breeder to rear the best cattle; by this we mean that it will be found the most profitable to rear such, that in their various points are best suited for the uses required of them, whether it be for the profitable production of beef, labor, or milk. What might be regarded as a good animal for beef, might not be as valuable for working purposes; while a good beef animal might also prove almost worthless in the dairy, and the reverse. There are also certain portions of the animal that are essential to its existence and welfare, but which economically considered, aside from this, are of but little value, and which in beef are regarded as waste or offal. If, for instance, the bones are large and coarse, or the head and horns are large in proportion to the size of the body, and ill-shaped, there will be a larger proportion of waste or offal than is necessary, and accordingly a smaller proportion of what is really valuable, while at the same time such an animal will require more food than one of small, fine-textured bones, and good points generally, since it is a fact known to every farmer that it requires a larger proportionate amount of food to make this offal, than it does to produce either flesh or milk. It will require nearly double the quantity of food to fatten a lank, tall, coarse-boned ox, than a finely formed, well-bred animal of the same weight. We know of a western farmer, who a few years since tried the experiment of fattening about 500 Texan steers by stall feeding, having previously prepared stables for the purpose, which had water conducted to them in pipes, with equal facilities for conveying grain and hay. The animals, being semi-wild, were pulled into the stables with lariats, tied to the stanchions, and remained there until fat, which was five months. Every means was used to keep them quiet, the stables being kept partially darkened and no strangers ever admitted.

Although these animals fattened very well, and brought a good price for beef in the New York market, the experiment was never repeated, for, to use the farmer's words,—“the larger price required for good grade Short-Horns would yield a better profit for the feed consumed.” Had this man better understood the laws which govern the animal economy, as well as proper sanitary laws, we doubt whether he would ever have attempted such an experiment when better and more profitable stock were attainable, or have confined 500 steers in partially darkened stables for five successive months, without permitting them the exercise of vacating their stables, once during that time. Coarse animals are always large feeders in proportion to their weight, and for any purpose whatever such animals are to be avoided.

When beef production is the object, the massive, compact, block-shaped body, with fine bone, is best suited to the purpose; one so formed as to admit of the laying on of the greatest amount of flesh in those parts that furnish the most desirable cuts at the butcher's block, and with the least possible amount of offal. A narrow-chested, gaunt, large-boned animal will require a longer time and a greater amount of food in proportion to his weight to be ready for the shambles than the latter, and when ready, cannot possibly furnish as much meat in proportion to his size and weight, or of as good quality.

The Hereford, Short-Horn, and Devons are probably the best types of beef breeds that could be mentioned, their carcasses when well fattened furnishing the largest proportion of good beef, compared with their live weight, or the least amount of offal. If working oxen are desired, a form compatible with strength, endurance, and activity, suited to the purpose, should be selected. A working ox should have considerable breadth to give sinewy power; he should also have large lungs, and sufficient room for their expansion to give him sufficient wind for the hard work he will be called upon to perform. A dairy cow should have a well-developed frame, and such as will admit of room for the healthful and active exercise of the organs of digestion and secretion. Her milk veins should be large and prominent, her udder capacious and set well forward, while she should be able to assimilate her food into an abundant supply of milk, and keep in good flesh.

She should possess all the characteristics which are the well-developed external marks of good milkers, and which very rarely, if ever, disappoint the practiced eye or skillful hand. Thus it will be seen that qualities that would be considered the highest possible degree of excellence in one breed or class of animals, might not be desired in another, but that each are to be judged by their utility for the purpose designed. Beauty of form and color should not be entirely ignored in cattle, but should always be secondary to utility; yet perfection of form, as we have seen, must differ very essentially in different breeds of animals, and it should be the aim of the breeder to attain the highest degree of excellence possible according to its respective kind.

**What Breeds to Keep.**—From the description of the many different breeds of cattle previously given, it will readily be seen that no single breed would be found superior to all others for all purposes and localities, embracing as our country does, such a variety of soil and climate. Before selecting a breed, the first consideration should be,—as previously stated,—its adaptation to the use to which it is to be appropriated, and second, its adaptation to the locality in which it is to be placed. The breed most profitable for the farmer who makes beef a specialty would in all probability prove the least profitable for the dairy; and the cow that would produce milk richest in the butter element, might not prove the most remunerative to the farmer for selling milk, unless an extra price was paid on account of its superior quality. The breed that would be the most profitable for the Western grazer, or the Kentucky farmer, might not be the best for the farmer in some portions of New England.

The choicest beef breeds should never be chosen for the dairy, and a large heavy feeding breed should not be selected for regions where pastures are scanty, especially if pasturing is practiced in summer, instead of soiling. The character and condition of the pastures in which the animals are to be kept in summer, and the quality of food they are to be supplied with in winter, will also require consideration in the choice of a breed. The farmer whose object is to sell large quantities of milk at the common price should select the largest milkers, while the farmer who aims to make the best butter and in large quantities, should select a breed that produces the richest milk. There are localities where the rich soil produces an abundance of the best grasses, with plenty of pure water and a mild climate. In a region of this kind any of the imported breeds would do exceedingly well; but there are other sections where the soil, climate, and conditions are such that a choice with reference to special adaptation would be necessary in order to reach the best results.

The large breeds, such as the Short-Horns, Herefords, and Dutch, are better adapted to rich, level, or rolling lands with an abundance of grasses, while the Jersey, Guernsey, Devon, Galloway, and Alderney would be better fitted than the former for localities where the pastures are hilly and less luxuriant. The principal characteristics of the beef and dairy breeds of cattle have already received so much attention in previous pages as to render it unnecessary to compare their respective merits in this connection; suffice it to state that in making a choice of breeds adapted to his locality, the farmer should be careful to select the one best adapted to the locality and conditions, and the special use to which it is to be put.

**Cattle One Should Never Buy**, can more easily be described than a selection made as "the best" breed, among the excellent beef and dairy breeds that we have at present to select from, each possessing especial valuable qualities. Allen has given a good pen-picture of the kind of cattle to be avoided, thus:

"A big-headed, narrow-chested, flat-ribbed, hollow-backed, narrow-hipped, and droop-tailed ox is a poor worker, and such a cow, if she be not a poor milker, is seldom a profitable one, for both ox and cow are huge feeders. The ox has no room in his narrow chest for full lungs to play. Therefore he is short-winded. His flat ribs and narrow hips allow him but a small development of muscular power. His strength is therefore contracted. His anatomy being sacrificed in breadth and depth, he has no place to lay on flesh as a beef animal, and he is worthless, comparatively, for any purpose. So with the cow; if she take flesh poorly, she gives a less quantity of milk; but if she do happen to milk well, it is because her food is chiefly thrown into the secretions of her milk veins, which happen, in such instances, to be extraordinarily developed. We have seen such, but they were the exceptions, not the rule, and all such cattle are to be avoided. There is no profit in them, any way; as a calf, the butcher does not want him, except at a reduced price; as a steer, the grazier jells down his price; as a working ox, nobody wants him, except he can get him "cheap;" as a fat bullock—if he ever can be fatted—the butcher "blows" on him; and as for the consumer—he is to be pitied. Soups, and dried beef—and poor at that—is all that he is fit for. He is a drag on every one's hands unfortunate enough to own him, from birth to slaughter. And so with the cow; poor in every quality, she goes through a miserable life, an object of contempt, and ill-usage throughout, simply because her breeder did not veal her at six weeks old, for she has never been good for anything in the hands of anybody since, and has taken the place of a better creature, which might have been profitable in every condition of her life, and a pleasure to every owner."

Such an animal as above described will not only prove unprofitable to the owner in the returns of beef or milk, but will consume nearly twice the amount of food that would have been required to maintain in good condition a really fine and valuable animal. Coarse-boned animals will invariably be found to be gross feeders, according to their weight, and will give the least for the food consumed.

**The Breeding of Cattle.**—The progress in agricultural advancement in any country or period of its history, is marked quite as much by the improvement of its domestic animals, as by the general methods of agricultural practice, the implements employed, and the skill with which they are utilized, etc. In none of the animals domesticated by man, is there manifest a more striking display of the breeder's skill, than in some of the improved breeds of cattle of the present time. The raising of cattle for dairy use or beef production has become such an important industry in this country, that the attention of farmers generally is being directed more than formerly to the necessity of keeping better stock than the native or common class of animals furnish, and the proper means are being employed more extensively towards the accomplishment of this object, by disposing of inferior animals, and substituting better breeds in their places, or by improving what they may have by judicious crossing with pure bred animals.

Many farmers, however, still make no attempt at improvement, because they have the mistaken idea that they must procure a thoroughbred breed in order to receive any great benefit by the change; this being beyond their means, they continue in the former way, and receive but small profit as the result. Others entertain a prejudice against blooded stock, and are under the impression that its superiority consists only in the possession of a pedigree. This is also erroneous, for thoroughbred animals have a value of their own, consisting of the many good qualities which they have inherited from their progenitors, and the power which they possess, called in breeders' phrase, "prepotency," of transmitting these good qualities and characteristics to their offspring, while pedigree is simply valuable as a kind of certificate of pure breeding.

Pure bred stock has a money value which is being more and more appreciated by the intelligent breeders and farmers of our time, for it has been tested and found of superior worth. The first and principal object of the farmer is to obtain the largest profit in return for his expenditure in money and labor, and this cannot be secured in the raising of cattle, or any other stock, unless he keeps such as will bring the largest profit on the outlay. It costs just as much, and requires just as much time and attention to keep inferior cattle as those of the best quality, and since thoroughbreds and their grades do yield larger returns in beef and dairy products than the native stock, it follows as a logical conclusion that they must be the most profitable for the farmer to keep.

**How to Improve Farm Stock.**—If a farmer cannot afford to substitute at once his common herd of natives for pure bred animals, —and but comparatively few farmers of the country have sufficient means to find it for their highest interest to do so, —he may do the next best thing, and the only one under the circumstances that seems practicable for him to do, and that is, to improve his stock, whether for beef or dairy purpose, by the use of a thoroughbred bull of the breed best suited to his requirements, and grade up, reserving such of the offspring for future progenitors as possess the best characteristics of the breed. By this means he would soon make a great improvement, which would be constantly progressing.

Some of the best grade beef animals are fully equal in the product they furnish, to the best pure-blooded beef breeds; while many of the high grades of the choicest dairy breeds produced by crossing with the best common cows have been known to nearly, if not fully, equal the thoroughbreds. Individuals of this herd will of course differ in this respect, and when breeding for dairy purposes those which possess the dairy characteristics most prominently should be selected. But, for breeding purposes, a thoroughbred bull of the best quality should be selected. Farmers should carefully avoid using a grade for this purpose, a mistake too commonly made, with usually disappointment for the result. Although a grade bull may be really a fine animal to all appearances, he cannot be depended upon for transmitting his characteristics to his offspring, and would be quite as apt to perpetuate the bad qualities of his ancestors as his own good ones. On the other hand, some farmers make the mistake of placing too much reliance on the pedigree of the animal, and consider that because a bull is pure bred, although he may be defective, —as occasionally we find animals in the best breeds. —he will transmit the good qualities of his progenitors rather than the inferior ones of his own. This is not a safe course to follow, and would probably lead to disastrous consequences.

The best bulls of the best breeds should be selected, and when these are used with dams of a breed of the same quality, it is a rare thing to meet with failure; the usual result will be a calf having the good qualities so strongly impressed upon it as to be able to transmit them with almost absolute certainty. A calf from a good native cow sired by a thoroughbred bull would be very liable to inherit many of the good qualities of the sire, while it might at the same time have the good qualities of the dam strongly impressed upon it, but it would be also nearly as liable to inherit her bad qualities or those of her ancestors.

The question might then be asked, wherefore the necessity of selection, in such a case, if the offspring would be liable to inherit the bad qualities of the dam or her ancestors? In reply we say the nearer we can approach perfection in the animal, the more liable are these fine qualities to be transmitted, providing there is a fixed habit of transmitting these qualities firmly established in the breed, by a long line of hereditary descent. For this reason, as previously explained, when both parents are pure bred animals we can predict the character of the progeny with almost certainty, but if the sire only is pure bred, the better the dam, the more possibility is there of the offspring being a good animal, than if the dam was inferior, since we believe the dam has nearly if not wholly as much influence in determining the character of the progeny as the sire, and it is always safest to run as little risk as possible, and select the best native cows in such cases.

The bull designed to get dairy stock should possess the characteristics which in the cow are indicative of fine dairy qualities, large hind-quarters, large and well-developed veins and escutcheon, fineness of form, mellow skin, etc. He should also be descended from the best dairy stock, and his dam be a good milker. For further discussion of the subject of breeding, we refer the reader to *BREEDS AND THE PRINCIPLES OF BREEDING*, in another department of this work.

Although much depends upon the breed with regard to the profits resulting from the rearing of cattle for any purpose, yet it is equally certain that stock of the best quality of its kind, whether native, grade, or thoroughbreds, will be sure to deteriorate, and become unprofitable by neglect and lack of proper attention.

We would impress it upon the minds of all farmers, that the most profit as well as pleasure consists in keeping good stock and in giving it equally good care, consisting of a liberal amount of food of suitable quality, an abundance of pure water, shelter from storms, the heat of summer, and cold of winter, according to the temperature and climate, also pure air when confined in stalls. Precaution should be taken to prevent interference with improvement in cattle by "scrub-bulls," whose progeny is not worth the raising. Such creatures are a nuisance to their owners and all adjoining neighbors, and by being permitted on the highway, or from breaking into enclosures, have been the means of doing much harm in this respect. Such animals are only fit for the butcher's block.

**Early Breeding of Heifers.**—Some breeds of cattle arrive at maturity considerably earlier than others. By breeding as early as practicable, without injury, much valuable time is saved, and the animal thus made more useful during her life, while it is found that there is no perceptible difference between the calves thus produced, and those of older cows. To farmers who are anxious to improve their stock in the shortest possible time, early breeding of their heifers is a great advantage. Early stimulating the secretions of milk in the growing heifer has a tendency to increase the milking propensity through life, while she is also more docile and may be handled more easily. If a heifer is bred from before her physical system is sufficiently developed and matured, it will have a tendency to check her growth and prove a positive injury. Much depends upon the condition of the animal, and the treatment she has previously received. Animals that are well fed and cared for from birth will develop much more rapidly than those that have been neglected and ill-fed. No heifer of any breed should drop her calf when much under two years of age. When two years or twenty-seven months may be safely taken as a general rule of practice, instead of three years, as in some cases a year is gained in the profit of the animal for dairy use. Most of the western ranchmen permit nature to take its own course in this respect in their herds, and the cows generally drop their calves at about the age of two years. There are well-authenticated instances of heifers calving at fourteen or fifteen months of age, and even younger.

A Mr. Eldridge Davis, living near Cambridge, Ill., owned a grade Short-horn heifer a few years since, raised by himself, that dropped a strong, lively heifer calf at the age of

eleven and a half months. Such instances are, however, exceedingly rare, and may be regarded as a misfortune. A period of less than twenty-two months or two years of age is not to be desired, and with slow maturing breeds a longer period is to be preferred.

**Drying off Cows.**—The length of time in which a cow should go dry before calving will depend much upon her milking qualities. Those cows that produce a large amount will generally hold out longer than those giving less, although there are some exceptions. Some cows will give a very large yield for four or five months after calving, and then gradually lessen the quantity until they are nearly dry, three or four months before dropping the calf; others give a good quantity of milk up to nearly the time of calving, and a few will yield it up to the very time. Usually cows will gradually diminish the quantity of milk yield, and no especial efforts will be required to stop the flow.

It is better for both the cow and her calf, as a general practice, that she should not be milked for at least six weeks before calving, and many farmers prefer to have the time extended to two months or more. The calf will be better developed and larger, and the yield of milk will be greater the ensuing season and hold out better under such conditions, than if the cow was milked up to the time of calving.

There are occasional exceptions, however, and it sometimes happens that, in cases where the milking qualities are very fully developed, it is difficult to dry a cow sufficiently to make it judicious to cease milking her much before the time of calving. The quality of food given at such times will largely influence the secretion of milk, and when the task of drying the cow seems a difficult one, avoid feeding roots much for a time, or other food that has a tendency to increase the flow of milk. In drying a cow the milk should be drawn at irregular intervals. The practice with some is to take but a part of the milk at a time, but this is not recommended, since the milk that remains in the udder is liable to become thick, and finally lead to inflammation and other serious consequences. The period between the milkings should be gradually lengthened, never regular, until the object is accomplished; but at each milking it should be thoroughly performed. After the cow is supposed to be dry, the udder should be frequently examined, as milk will occasionally, under such circumstances, be secreted in small quantities, and should be drawn.

**General Treatment of Breeding and Milch Cows.**—All breeding and milch cows should be treated with the greatest kindness and gentleness. They should never be hurried in driving, or jumped over fences or bars. They should never be worried by dogs, or forced to approach anything that they regard with fear. Never permit them to be shouted at, or receive a blow for any cause. Be gentle with them always, and never allow a man or boy on the farm who violates these rules.

Unkind treatment will frequently cause a cow to withhold her milk, a habit that will soon greatly injure her milking qualities, while harsh treatment to a pregnant cow will frequently cause abortion, which is a serious evil, for such results are very liable to recur again.

A cow in milk may be greatly injured, if not made valueless, by a thoughtless or cruel herder, or brutal milker; hence the importance of observing the directions previously given. It is found that cows are in heat once in about twenty days; hence, after being served, if the heat does not recur in that length of time, it is to be presumed that she is pregnant; and such, with rare exceptions, will be the case. Within three or four months, if she remain quiet, proof of her pregnancy may be ascertained by gentle pressure of the hand on the right flank. The beating of the fetal heart may also be noted at three to four months by placing the ear close upon and touching the right flank. The udder also will have increased in size.

The food should be sweet and nutritious, given often, and in sufficient quantities to appease hunger. The main point in feeding is to keep the animal in a healthy and thrifty

condition, and not permit her to lose flesh; on the contrary, it would be better to have her gain flesh during this period. With this object in view a change and variety of food is important. It must be remembered that the food she eats must not only supply nourishment to her own physical system, but to that of her offspring also, and hence there is an extra demand for the material. A calf at birth usually weighs from 75 to 80 pounds, and some of the large breeds, such as the Herefords and Short-Horns, even considerably more than this; and it requires at least fully as much food to produce such a calf, as to put seventy-five pounds of flesh in her own body. Oats are excellent food for cows when dry, being rich in muscle-forming material. Corn meal alone is not suitable food for cows at such times, but may be fed with clover hay. Two quarts of corn meal and one quart of oil meal per day is also very good. Roots, such as potatoes, turnips, carrots, mangold wurzels, etc., fed in moderate quantities, may also be given. Care should be exercised, however, not to give food that is too rich or stimulating for a week or two before calving, or to permit the cow to fill herself with coarse hay or other equally distending food about the time of this event, as it might be followed with ill consequences.

As the time of maternity approaches, the udder must be closely watched that inflammation may not ensue, and this becomes all the more necessary with heifers about to bring their first calf. Should the udder seem too full of milk, it will be necessary to draw from the teats from one to several quarts. We have known of instances, where, in the abundance of succulent grasses of May or June, it was necessary to draw the milk for several days before calving in order to prevent serious inflammation of the udder. We are aware that some object to this, as injurious to both dam and calf, but in cases where it seemed necessary by the unusual distention of the udder, we have never known any results but the most satisfactory to follow such a course. The drawing of the milk should be done regularly, however, and never at irregular intervals.

**Care at Time of Calving.**—The common duration of pregnancy in cows is 284 days. As the time of calving approaches, the cow should be removed from the rest of the herd to a box-stall or comfortable shed, and be supplied with an abundance of good clean bedding. Here she should remain undisturbed, being supplied regularly with food and drink. In the majority of cases the parturition will be natural and take care of itself, and the less the cow is meddled with, the better. Nature usually does her work well, and needs no interference from man. But there are exceptions, and for this reason it is well that she should be watched in order to see that no difficulty occurs that may require immediate attention. Do not however disturb her by too constant watching. The natural presentation of the foetus is with the head lying upon the fore legs, any deviation from this being unnatural and liable to be attended with difficulty. With the natural position, nature will usually require no aid. Whether the cow should be permitted to eat the "after birth" is a question upon which intelligent breeders seem to entertain different opinions.

It appears to be natural for some animals to do this, and that fact might of itself be an argument in favor of permitting them to do so, disgusting as the practice may seem. We can, however, see no reason why following this natural instinct could in any way benefit the animal, on the contrary, it to all appearance would be an injury to have such a bulky mass of indigestible matter in the stomach, but we have never known evil results to attend either course.

If there is any difficulty in parturition by a wrong presentation of the foetus, a good veterinarian should be employed if possible. By such timely and skillful assistance, the life of both the calf and the dam may be saved. Never employ an ignorant, brutal man who would resort to violent means in such cases. False presentations are varied, though rare; the most common is that of the head first, with the legs doubled under the body. In all such cases the right hand should be well smeared with sweet oil or fresh lard, and carefully

introduced, and the position changed to the natural one, if possible. Assistance may be given when the natural throes are repeated, but cruel violence should be avoided. When the nostril of the calf has protruded, and the position is found to be unnatural, the head cannot be pushed back without destroying the life of the calf.

After calving, the cow should be given as soon as possible, a warm bran-mash. If she has not already been relieved of the after-birth, this will have a tendency to produce its easy separation. If there seems to be difficulty in this respect, a dose of four ounces of salts mixed with two ounces of ginger may be given after about eight hours. Sometimes a pint of flax-seed boiled and given in thin gruel will loosen a retained placenta. A pint of oil meal in thin gruel given every day for a week before calving will usually prevent any difficulty of this kind.

If, however, every means employed prove ineffectual in its removal after twenty-four hours have elapsed, there will be a necessity of securing its separation, and removal by other



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means. The right hand and arm should be greased with fresh lard, and carefully introduced into the womb. With the thumb and fingers the various connections of the membrane may be separated, and it can be removed from the body. Considerable time should be allowed for doing this, and all violence avoided. Many valuable cows have been lost through the brutal treatment of ignorant persons at such times. Avoid giving very cold water for several days to a cow after calving. She will be quite thirsty, and should have water given her frequently in moderate quantities, but it should be warmed just enough to take off the chill. Milk fever is sometimes caused by a neglect of this precaution. She should also be protected from cold and storms. For a week after calving it will be well to feed a cow moderately, giving at the same time some laxative food, such as flax-seed gruel and warm bran mash.

**Care of Calves.**—The best time for calves to be dropped is in the spring. This seems to be Nature's time for the commencement of the young life of most animals, and no better one could be chosen. The calf will generally be able to stand immediately after birth, and to suckle the dam without any assistance; but sometimes, owing to weakness, it

will need to be held to the cow to get its first meal, which should be done as soon as practicable, since the milk of the dam will strengthen it, and bring the stomach and bowels into healthy action, enabling them to discharge the foetal nutriment they always contain at birth. Whatever use is to be made of the calf, many consider it the best practice to allow it to remain with the cow for about three days, permitting it to draw all the milk it wants during that time, the milk remaining in the udder to be taken by hand twice a day at the usual time of milking. Neglect in this latter respect might greatly injure the cow for milking purposes, as for instance, if she gives more milk than the calf can take, and a portion is left to produce inflammation in the udder. Besides, the milk of the cow will not be fit for use until after the expiration of at least three days, and if the udder should be inflamed and hardened, nothing will so soften and reduce the inflammation as this natural method of its being drawn by the calf.

Another practice preferred by others, is to separate the calf at once from the cow, not permitting it to suckle the dam at all, except where there is a hard and swollen condition of the udder. In such cases the calf is taken after birth to a warm, dry place, out of sight and hearing of the dam, where it is rubbed dry, and when able to stand, is fed with new milk warm from the cow, which is given it regularly three or four times a day for the first two weeks. When not direct from the cow, it should be warmed. The advocates of this practice claim that it prevents the cow from becoming strongly attached to the calf as it would by having it remain with her any length of time, after which its removal would cause her to fret and mourn for it to the extent of causing her to withhold her milk.

This method is practiced in Holland. It seems to us that, all things considered, it is better, and attended with less care and labor to the farmer, to permit the calf to remain with the dam, at least, for the first twenty-four hours after birth, leaving them as quietly to themselves as possible. Where the udder of the cow is considerably distended, it may be best to milk the cow at once after calving, but where this is not the case, we should allow the calf, if he is strong and able to draw the milk, to reduce it first.

**Calves for Veal.**—When the calf is designed for veal, he should have all the milk that he will take direct from the cow, by having access to her at morning and night. He should be fastened with a strap about the neck with three or four feet of rope, and confined to a limited space away from the cow, at other times, where he will have plenty of pure air, and clean bedding. The flesh of calves confined in foul stables is unfit for food, it not only being unhealthy, by the blood of the animal being poisoned by breathing such air, but the flesh will be tainted with it. The milk of the dam, and an abundance of it, is required to make the best veal. Sometimes oatmeal, cooked or raw, cooked corn meal, or oil meal is fed besides, in small quantities. In such cases the quantity should be very small at first, and gradually increased.

**Rearing by Hand.**—When a calf is to be raised, it should be separated from the cow on the second or third day, or sooner if deemed desirable, and tied in a comfortable stall out of her sight. A strap should be fastened about his neck in such a manner that his pulling upon it will not cause it to tighten and choke him. He should have sufficient play to his rope to permit him to change his position, exercise a little, and lie down comfortably; from three to four feet will be sufficient. Give him plenty of nice bedding, and keep his stall clean. He should be taught to drink by bringing his muzzle down to the milk in a pail or trough, and be permitted to suck the fingers at first. After feeding in this manner a few times, he will soon learn to drink, although some calves will learn more readily than others. He should be fed with new, warm milk three times a day for the first two weeks, in sufficient quantity to satisfy hunger. Feed regularly and liberally, although do not go to the extreme of gorging.

It is too often the case that young animals are stinted in their food and their growth thus stunted from birth. In raising animals, quite as much depends upon the amount and quality of food given, as in the breed itself. The animal system cannot develop and build up unless it has the material to build up with, and this can only be supplied through the food. New milk is thought by some dairymen to be too expensive to feed for a long time to calves, and it may be gradually substituted by warmed skimmed milk, but of course the new milk is better for the calf, being more nutritious, and it should have such food for at least three weeks. After this period new milk may be given in part, if desired, and the warm skimmed milk added. Oat or barley meal made into a gruel by being thoroughly cooked may also be given in small quantities at first, gradually increasing the rations. Coarse corn meal should never be given to young calves, and never raw. Fine corn meal, well cooked, may be fed to advantage. Oil meal is thought by many to be very good for this purpose. Flaxseed boiled for several hours until it is of the consistency of jelly, is also good for this purpose. These when fed should always be mixed with the milk.

If the weather is sufficiently warm, after a while it will be well to allow the calf to remain during pleasant days in a small yard where there is green grass. It will soon learn to nibble the grass, and drink water; besides all animals thrive better to be allowed the sunshine a portion of the time. At night, and on cold or stormy days, the calf should be kept in a warm stable. Calves, and all young animals, should always have access to a plentiful supply of pure water. Calves will also early learn to eat nice rowen hay. A little salt should also be given them as often as once a week, either in their food or in a separate trough. The longer the milk and meal rations are continued, the better for the calf. Liberal feeding of this kind continued through the summer, will well repay in the superior quality of the animal thus produced.

Successful cattle feeding begins with calf feeding, while neglected calves will scarcely ever grow into profitable bees or valuable dairy cows. Any check in the growth of a calf from its birth, is a loss to the owner, as it will require a larger amount of food to counteract it, besides a loss of time; and the skillful feeder, understanding this, strives to *keep up a constant growth* of his calves by liberal feeding and a proper development of the digestive powers. Calves and all young animals should always receive kind and gentle treatment. They should be frequently handled, and in this way made docile, a lesson that they will never forget, while at the same time harsh tones and rough treatment will be equally well remembered, and their effects be correspondingly detrimental. A heifer or steer that has been made wild and timid by rough treatment, although a really fine animal, can never be of as much value to the owner as one that is docile and has never learned to fear man.

**Fall and Winter Care of Calves.**—A small ration of grain, such as oats or wheat middlings and oats, is highly beneficial to calves all through the fall and winter. Beginning in August with a pint a day, they will soon eat two quarts per day, and the growth will be steady. English breeders use linseed oil cake or oil meal quite extensively, one pint a day being given to each calf until the milk supply is wholly withdrawn, when a quart of oil meal and middlings mixed is fed. Corn should never be given as a principal food to young animals, since the albuminoids and phosphates are in too small proportion in corn to produce a full and complete development of muscles and bones. It also has an unpleasant effect upon the stomach and bowels of calves, being difficult of digestion as well as too laxative. The following by a prominent Western breeder gives such excellent advice on the winter care of calves, that we give it insertion.

"The first winter is a trying time for calves. Some, who mean to be judicious feeders, think the calf needs to be toughened the first winter, so that he may not become too delicate, and may have a healthy, strong constitution. So the calf is often required to dig for its grass under the snow, pick at straw stacks, or run in a stalk field, exposed in the most inclement

weather with insufficient nutriment. If this is a good way for the young animal, why not apply the same practice, comparatively, to our children? If scanty nourishment and exposure strengthens the constitution, why not carry out the principle where it will have a still more beneficial result?

The result of this most pernicious practice is too often seen in thin, unsteady-gaited calves in spring, whose constitutions have been thus strengthened (?) to the last degree of tenuity. Such thin animals are supposed to gain faster on the sweet early grass of spring; whereas they will require two months to regain their plump full weight, and two months more to reach the point they should have attained at the coming of spring grass. It is a most important point that the calf should never lose the thrift it possessed as a sucking calf—or, as it is sometimes expressed, should never lose its 'calf-flesh.' When the calf is to be grown for beef, this view would seem to be too clear to require argument. The shorter the time required for the animal to reach the market weight of 1,300 to 1,600 lbs., the greater must be the profit upon its market value. Every period of slow or defective growth is a clear loss in feeding. All the food consumed during these periods is thrown away, as compared with a system of feeding which aims at a constant progress in growth and ripening from the first day of life to market maturity.

The assimilation of the calf is excellent when receiving the milk of the dam, whether this is new milk or skimmed milk. The secretions of the system are then in the most active state, and it is of the utmost importance that this active growing habit should be kept up; and to do this the food must be appropriate and sufficient for all the wants of the system. The digestion of the healthy calf is strong and active, and it is not difficult to continue this rapid growth through the winter, if a full ration is supplied. If the calves are exposed to the lowest temperature of the season, they must be fed extra food to counteract the effects of such exposure. It is difficult to keep up the full rate of growth, under such circumstances, in the coldest weather.

We regard it as very bad economy to winter calves in the open air where the temperature goes very low. It is true that the best feeding may bring them through in respectable condition even there, but the expense is greater than the cost of shelter. Calves may be made comfortable in the West, where barns are scarce, under sheds covered overhead and on the sides with bundles of corn stalks properly fastened, or with straw or prairie grass. Such sheds will very thoroughly break all wind, and make a warmer shelter than a loosely boarded barn.

The calf should have the most nutritious food to carry it through the first winter. Farmers would find it most profitable to provide early cut grass, nicely cured, or a second cutting of grass or rowen for their calves. This hay, only second to good grass, will be eaten with a good appetite, and, with a small grain ration, will cause calves to grow rapidly through the first winter. Clover, cut just before blossoming, is an excellent food for calves. It has a larger percentage of muscle-forming food at this early stage of growth, and is also more palatable. But it is quite unprofitable to winter calves upon poor hay, straw, and corn fodder. If such coarse fodder is the best the feeder has, he may still bring his calves through in fine condition by feeding a proper grain ration. With such poor fodder the best addition is one quart of oil-meal, and two quarts of oats and corn, ground together. These three quarts, mixed and given in two feeds, make a day's ration to each calf. Oats may be fed unground, and are well digested by calves. We have found calves to digest unground corn much better than older cattle. Linseed oil meal has a most salutary effect upon the health of the calf, keeping its digestive organs in excellent condition—having, in fact, the same apparent effect upon the stomach as tender grass. If the feeder cannot get oil-meal conveniently, then a good combination is one-third each of corn, oats, and wheat bran, the two former being ground—four pounds of the mixture for a day's feed.

If the grain ration has not been given during the early part of the winter, so much the more reason for feeding through March and April, quite up to good pasture. Feeding them well through these months will greatly improve them, and cause a better growth through the summer. This grain ration will prepare them for the change to grass. When animals are poor, and fed wholly on poor, dry fodder, the change to grass is very violent, and often produces scouring; but from a richer ration of grain to the sappy grass, the change will be agreeable, and they will put on weight rapidly."

Calves should be kept by themselves for the first year at least, and not be confined in an enclosure with full grown cattle. Young stock are not unfrequently hooked and otherwise injured by allowing the entire herd to run together.

**Castration.**—This is a cruel and painful operation, and should be performed as humanely as possible by the use of chloroform. Those male calves which it is not desirable to keep for breeding purposes should be castrated when two or three months old. It should never be delayed until they reach the age of six months. The conditions attending this operation in cattle, aside from the age when it should be performed, are essentially the same as for the horse, the directions for which will be found in the Horse department of this work (Vol. I., page 756, which see).

**Spaying.**—This operation consists of removing the ovaries of the female, and corresponds to castration of the male. It is generally performed for the purpose of fattening, as such cows will fatten more readily and make very fine beef. Spaying also prolongs the full flow of milk, when performed at the proper time and manner.

Such cows have been known to continue in milk for years. Spaying is, however, a cruel practice, and attended with considerable risk, and is not to be generally recommended. It is a delicate operation and should never be attempted by an unskilled person. Spayed cows are not as generally useful as those that have not been operated upon, and tend, in some cases, to the laying on of too much fat. We give no description of the process of spaying, as it is a difficult and delicate operation, and should be seen as performed by a skillful person, in order to understand it sufficiently well for successful practice.

Animals that are to be operated upon should be fed lightly for a day or two previous, and given bran mashes a few days afterward. Peritonitis is quite liable to set in, unless the operation is performed with the greatest skill and care, and even under such circumstances there will be an occasional loss from this disease.

**Care of Bulls.**—In order to be well fitted for stock purposes, the bull should be well fed from the time of his birth. The aim of the breeder should be to keep up a steady growth of the animal to maturity, without making him over-fat or forcing his growth; for while it is a very injurious practice to stunt the growth of such stock with insufficient food, or that of a poor quality, it is also an injudicious practice to feed too highly, and hasten maturity with stimulating food.

A bull should grow up naturally into a healthy, well-developed animal, maturing at the time and in the way in which nature has chosen, *liberal* feeding, but *no forcing* being the rule. Milk should be given for the first six or eight months; this is the natural diet and therefore the best for the young animal. It may, however, be supplemented with a similar amount of food as has already been recommended for young calves, such as oat, pea, barley, or oil meal, and grass, hay, or ensilage, etc., according to the age and season.

After weaning, he should be provided with a plentiful supply of succulent and nourishing, though not rich food. A young bull whose growth has been forced for show purposes, although he may be a finer looking animal by such treatment, will not be as valuable for breeding as though he had been fed more judiciously. It is found by experienced breeders, that it is unwise to use a bull for breeding purposes until he is two years old. If used to

any extent previous to this period, the natural result will be to render him a less valuable animal for future use, while calves from such early service will not be as well developed and strong as they otherwise would be.

When two years of age he may be safely used for service from fifty to seventy-five times during the season; after this period the number may be extended to one hundred or even more per season. If he proves a good stock getter, and is not a vicious animal, he may be used as a breeder until he begins to fail, which will generally be from ten to twelve years of age. Two noted bulls, owned and used in the herd of Robert Colling, were employed for breeding purposes until they were respectively thirteen and fifteen years old, having begun service at two years. In order to make a bull gentle and render him more easily managed, he should be early taught to lead, and be accustomed to frequent handling. When two or three days old he should have a strap put about his neck, to which a rope three or four feet long should be attached. By being tied in a stable in this manner for a time, and occasionally led about, he will soon learn to submit to a power stronger than himself, a lesson that will be a valuable one; still every precaution should be taken as the animal grows older, to avoid as far as possible, all danger from injury by a cross bull, for it frequently happens that a bull that has previously been kind and gentle will become unaccountably and suddenly vicious, attacking the person having charge of him without the least warning.

When about eight or nine months old, a copper ring should be put in his nose. Steel and iron are sometimes used for this purpose, but they corrode more than copper, and should not for this reason be recommended. A strong stick, seven or eight feet long, with two links of chain and a snap hook at the end, fastened to the ring in the nose, is the safest arrangement for leading a bull, as he might, in case of a sudden attack upon his keeper, be kept from rushing upon him by this means, and which could not be done by simply a rope tied into the ring.

Instances are not rare of persons being severely injured or killed by neglecting to observe these precautionary measures. It is never safe to trust even the most pleasant tempered bull without precautionary measures against danger, for there is generally no warning against the sudden frenzy that might seize the animal. Therefore a ring in the nose, or some equally good substitute should always be employed.

Some bulls are naturally vicious, others are made so by being teased, or by harsh and violent treatment. A decidedly vicious bull is not only a dangerous animal to keep, but will be liable to transmit this characteristic to his offspring, and would best be disposed of to the butcher.

A bull should be treated kindly, and yet always managed with firmness. The keeper should never let him know that he is afraid of him, and yet he should never be trusted, however seemingly gentle in disposition.

When fully matured, a bull will get stronger and better calves than when young; it is therefore the opinion of most breeders that the most desirable age for the bull as a getter of stock is when he is from five to ten years old, being then fully matured and well developed in all respects. Though well fed at all times, he should never be kept very fat; when used in constant service, he should be fed more than at other times. When kept in a stable, he should be led about the yard for a time each day for exercise. No animal will be healthy without a sufficient amount of sunlight and exercise. A better plan than to keep him constantly in a stable, is to permit him the range of a small yard leading from the stable, where he can go from one to the other as he chooses. The practice of turning a bull into the common pasture with the cows is not to be recommended.

A bull should be groomed with the curry-comb or brush, and his skin kept clean and free from dandruff by this means and occasional washing. He should not be kept entirely apart by himself, when confined in the barn, but should have a stall where he can see the other cattle. This will make him more contented and quiet.

**Winter Protection for Cattle.**—There can be no question that the most profitable and economical method of cattle management in winter, for the main portion of our country, is to provide warm shelter and protection against storms and the inclemency of the weather. Where cattle are exposed to the cold weather during the winter season, a much larger proportion of food is required to keep up the animal heat, than where a comfortable shelter is provided, since food is required to sustain animal heat, and always in proportion to the intensity of the cold; and setting entirely aside all considerations respecting the cruelty to animals of exposing them to the cold storms of winter, it seems to us that any farmer will find it more profitable in a term of years to provide good barns to shelter his stock, than to furnish the extra amount of food required to warm the cattle, and keep them in good condition.

With the modern conveniences for handling fodder in barns, the labor of doing this is not much greater than feeding them in the open fields, while all the waste and inconvenience attending the latter would be avoided. It has been estimated that the difference in the amount of food required to maintain cattle in warm, comfortable stables in winter, as compared with the amount of food necessary to produce the same weight in the open air, is as sixteen to twenty-eight; that is, sixteen pounds of corn would be required for the former, while twenty-eight pounds would be necessary for the latter. This may seem a large allowance to make in food for the difference in temperature between warm stables and the open air, but we believe if the experiment were carefully tested, it would be found none too large, when all the conditions were taken into consideration.

The temperature alone is not the only consideration; when animals are out in the storm with no protection except the windward side of a hay stack, or when obliged to stand shivering for hours in the fence corners, and the hair gets saturated to the skin with melted snow or rain; in such cases there is not only the temperature to withstand, but an extra amount of heat must be supplied from the body to evaporate the moisture. A western writer of note states that the storms of winter in that section are so trying to animals exposed to them, that many farmers have found it impossible to produce any gain with one half bushel of corn fed per day to each steer during a stormy February and March.

Young cattle that cannot be kept growing during the winter, and all others that cannot be kept in good condition will have to make up the deficiency afterwards in a larger proportionate length of time and amount of food to accomplish it, and such a system of management is consequently not attended with as large profits to the farmer as where the growth of the young animal is constantly kept up, and stock are kept in good condition. It not unfrequently happens that calves that are left out during the winter exposed to the cold, seem no larger, if as large, in the spring than they did at the beginning of the winter, and will require several months to make up what they have lost during that time, while they will never wholly recover from the effects of having their growth arrested at this growing period, but will be in a measure dwarfed and stunted.

We have already treated at such length in the department of Farm Buildings, the importance of properly constructed stables, that anything additional in this connection would seem a repetition; suffice it to say that stables should always be so constructed that the wall cannot be penetrated by wind and snow. Stables, the walls of which have cracks that will admit a constant draft upon animals confined within them, or that in snow storms will permit the snow to cover their backs, are little, if any, better than none; since if out in the open field cattle would be able to walk about and keep up a circulation by exercise, while tied in the stable they are unable to do this. Stables should also be so ventilated that pure air may be supplied to the animals, and the bad air conducted away without exposing them to a current.

All stock, when stabled, should have some exercise every day in the open air if the

weather is not stormy or too cold. If the sun shines they should be allowed their liberty for a while in a warm sheltered yard. A sun bath is one of the best things a farmer can permit his cattle to enjoy in winter, as it is a promoter of health and general thrift.

Where cattle are kept in such large numbers that it would be impossible to provide stables for them, as in the extensive grazing regions of the west, for instance, a sufficient number of sheds should be provided, where the cattle can seek protection when they wish. In the extreme Southern States, the climate is such that excellent pasturage may be furnished for stock during the entire winter. The varieties of grasses best suited to this purpose have already been given in Grasses and Forage Plants. The farmers of this section have but little trouble or expense in wintering their cattle, compared with that of the Northern farmer.

**Food for Cattle.**—A sufficient amount of suitable food is necessary to keep cattle in a thriving condition, and this should be furnished them regularly at all times. By suitable food we mean that which contains in proper proportions the elements for the formation of fat, bone, and muscle. It seems to be the opinion of some farmers,—if we may judge by their methods of practice,—that it makes but little difference what cattle are fed upon during the winter, providing they can be so managed as to be taken through the winter in some way, until the pastures are ready for spring grazing, and if they come out of their winter quarters "spring poor," it is no more than is to be expected. We accordingly find it no uncommon thing for cattle to present a half-starved appearance in the spring, having only about one-half the amount of flesh on their bones that they did in the autumn.

Farmers pursuing such a course do not appear to consider that by their method the growth of the animal is lost during the winter, and that it will take a large portion of the summer to make up this loss. In order to keeping animals steadily growing the food must not only be good in quality, but of sufficient quantity. What is claimed for the famous beef breeds is, that from long, pure, and skillful breeding, they have attained the highest capacity to utilize food in producing the best quality of beef in the shortest possible time, and at the least cost; yet, even with such breeds no good beef can be produced without appropriate food in sufficient quantity, given at proper intervals. The same may be said of the utility of the most valuable dairy breeds; the highest success cannot be attained without their being properly fed and otherwise cared for.

While it is true that much depends upon the breed, it is equally true that much also depends upon the food, and general management with respect to maintaining the excellent qualities of the breed, and securing the highest results from them. It is the law of nature that plants and animals are modified by the character of the food which sustains their growth. Plants growing near the sea take from the soil impregnated with its salt a large proportion of soda, which is seen in the ash of the plant when analyzed; but on removing these plants inland, they take from the soil potash, instead of soda, and the plant is accordingly modified. It is a well known fact that wheat of the same variety will possess qualities according to the soil upon which it grew, and that which is grown upon a clayey soil usually contains the largest proportion of gluten.

The wild turkey, after being domesticated for a time, loses the peculiar flavor of its flesh, which cannot be distinguished from that of the common turkey. Dr. Bachman states that he has seen turkeys raised from the eggs of the wild species lose their beautiful metallic tints and become spotted with white in the third generation. The wild ducks in the ponds of St. James Park, which had never been crossed with domestic ducks, are said by Yarrell to lose their true plumage after a few generations. Numerous other instances might be cited to show the effect of food in changing the qualities and characteristics of plants and animals, but a sufficient number have been given to illustrate the importance of giving all animals good and suitable food, and a liberal supply of it. The food which nature has provided for

cattle, and which seems to be, the chief reliance of the farmer, consists of the mixed grasses of the pasture, or their equivalents in hay or ensilage.

To these, as circumstances and conditions may require, are added grain of various kinds, roots and other edible material. In the northern section of the country, where the winters are long, cattle should have their pasture supplemented with other food quite early in the season. This prevents them losing flesh at the beginning of the winter, and enables them to go into their winter quarters in good condition. The grasses become greatly injured by the hard frosts for a long time before snow covers the ground, and as an article of food lose in this way much of their nutritive properties. When, therefore, the pasturage begins to fail, cattle should be fed with a suitable amount of other food to make up this deficiency, the quantity given being increased as the season advances, until the pastures come to be depended upon.

This will prove a more economical method than to allow the cattle to lose flesh before winter sets in, although it requires a larger amount of hay and grain to be used during the season. It is the poorest kind of policy to delay giving grain or other feed to cattle until they are finally placed in their stables for winter. At all events, individual animals that have not attained a good condition should be selected out and given an extra allowance of food of the best quality.

There is an old adage commonly repeated, but none the less true, that it will be well for all farmers to bear in mind in this connection, which is as follows: "A beast well summered, is half wintered; and well wintered, is half summered." By heeding the above maxim, no time will be lost in the growing period of the animal, or in recovering from the poor condition occasioned by insufficient food. Cattle should be in good condition at the beginning of winter, and kept so through the season.

**Quality and Quantity of Food, etc.** — With respect to the quality and quantity of food to be given cattle, no definite rule can be prescribed which would apply to all cases, each depending upon many and varying circumstances, such as age, the use required of the animal, the season, the system of feeding, etc. Some cattle require a much larger amount of food in proportion to their size than others. In all cases the quantity will be largely influenced by the quality. Under no circumstances should cattle be kept hungry, but should always have a sufficient amount of food to satisfy hunger, for both humane reasons and those of economy, it being the most unprofitable course for any farmer to pursue to keep cattle or any animal in a half-starved condition.

Young cattle should always be fed well, for there is no time in the life of an animal when good food and a liberal supply in proportion to the size, is as much in demand or pays as well to supply, as when the animal is growing. This is the time when the system is to be built up with flesh and bone material, and increased in size; besides the ordinary wastes are to be met, and a good supply of the material in the form of proper food must be given to accomplish it all. They therefore require more food in proportion to their size than mature animals, in which the muscular substance and bone structure are fully formed.

If beef is the object, the food given must be in quality and quantity to produce the best and largest amount of beef in the shortest possible time. Milch cows should be given food that will induce the largest secretion of milk; they also require that of a better quality than stock having no such drain upon the system. When an ox is being worked, he should have an additional amount of food given to that allowed when idle.

Corn meal is excellent, combined with grass, hay, or ensilage, either for oxen that are being fattened or for those used in labor, the former of course being fed much the largest quantity of meal. Roots are excellent for milch cows, also ensilage, cut feed, such as hay, oats, millet, or corn stalks mixed with shorts, and corn meal, linseed or cotton seed meal, thoroughly moistened with water. Warm water should be used for moistening in winter. Oat meal and a few roots are good food to supplement hay or ensilage for young cattle.

It is well understood that cattle or any other stock will gain more rapidly on a variety of food, than when confined to a few kinds only, and the feeder must use skill and judgment in making a proper allowance for a difference in the quality of different varieties. Another important point in the care of cattle, and one which many farmers are slow to learn, is the variation of the amount of food according to the temperature. In very cold weather, the first demand made upon the food consumed by the animal is to maintain animal heat; if there is a surplus beyond this, it goes to build up the tissues of the body and store up fat. If therefore, only a sufficient supply of food is given to maintain a proper degree of animal heat, and not enough to maintain the general waste of the system beside, there must be a falling away in flesh as a natural result.

Where cattle have a free range of pasturage, or where soiling is practiced, there will be no difficulty with digestion, and there will be a good condition, as far as the bowels are concerned; when confined in stables, with little or no exercise, and fed mainly on dry food, as is frequently the case in the winter management of stock, or when suddenly changing from grass to hay, it frequently happens that a very different condition will exist, which, if neglected, may lead to serious evil. In such cases, a judicious use of bran, corn meal, ground oats, or oil cake, will counteract the constipating tendency. Roots, such as turnips, potatoes, etc., given in sufficient quantities will also be valuable under such conditions. Salt is likewise frequently used with good effect, permitting the animal to drink freely afterwards; the presence of a large quantity of water in the bowels having a similar effect to an injection of water.

**Rations for Farm Animals.**—The following table of feeding standards is given by Dr. Wolff of the Agricultural Academy at Hohenheim, based upon the careful experiments made at the German Experiment Stations in feeding, and the analyses of different kinds of food, embracing a period of twenty-five years. Although it is not by any means claimed that they are not subject to improvement, yet they will serve as a guide to the farmer in determining the approximate amount and value of food rations for farm stock under different conditions and circumstances.

The table gives the quantities and proportions of the digestible food elements which are to be given in the daily rations of farm animals in order to secure the most satisfactory results. The term "total organic substances," as used in the table, means the organic matter of feed considered free from water and ash; and the difference between total organic substances and "total nutritive substances," expresses the quantity of indigestible or undigested portion of the ration. The column of the table headed "nutritive ratio," gives the proportion of digestible albuminoids to digestible carbohydrates, including fat.

With regard to the food elements of the following table, a leading agricultural authority says:

"THE ALBUMINOIDS, which are represented in animal food by the casein or curd of milk, the white of egg and lean meat, and in vegetable food by the gluten of wheat (wheat gum), and other substances quite similar to milk, casein and egg-albumin, have a different physiological significance from the carbohydrates, which are fiber or cellulose, starch, the sugars, the gums, and similarly constituted matters. The albuminoids may easily be made over by the animal into its own substance, i. e., into muscles, tendons, and the various working tissues and membranes which are necessary parts of the animal machine, because they are the same kind of materials, and, chemically speaking, of the same composition.

THE CARBOHYDRATES, on the other hand, probably cannot serve at all for building up the muscles and other parts of the growing animal, and cannot restore the waste and wear of those parts of mature animals, because they are of a very different nature. They contain no nitrogen, an element which enters into all the animal tissues (albuminoids) to the extent of some fifteen per cent. of their dry matter.

TABLE OF FEEDING STANDARDS.

PER DAY AND PER 1,000 LBS. LIVE WEIGHT.

|   | Total organic substance. | Nutritive (digestible) substances. |                |      | Total nutritive substance. | Nutritive ratio. |
|---|--------------------------|------------------------------------|----------------|------|----------------------------|------------------|
|   |                          | Albuminoids.                       | Carbohydrates. | Fat. |                            |                  |
|   | lbs.                     | lbs.                               | lbs.           | lbs. | lbs.                       |                  |
| 1. Oxen at rest in a stall, . . .             | 17.5                     | 0.7                                | 8.0            | 0.15 | 8.85                       | 1: 1.2           |
| 2. Wool sheep, coarser breeds, . . .          | 20.0                     | 1.2                                | 10.3           | 0.20 | 11.70                      | 1: 9.0           |
| "    "    finer breeds, . . .                 | 22.5                     | 1.5                                | 11.4           | 0.25 | 13.15                      | 1: 8.0           |
| 3. Oxen moderately worked, . . .              | 24.0                     | 1.6                                | 11.3           | 0.30 | 13.20                      | 1: 7.5           |
| "    heavily worked, . . .                    | 26.0                     | 2.4                                | 13.2           | 0.50 | 16.10                      | 1: 6.0           |
| 4. Horses moderately worked, . . .            | 22.5                     | 1.8                                | 11.2           | 0.60 | 13.60                      | 1: 7.0           |
| "    heavily worked, . . .                    | 25.5                     | 2.8                                | 13.4           | 0.80 | 17.00                      | 1: 5.5           |
| 5. Milk cows, . . .                           | 24.0                     | 2.5                                | 12.5           | 0.40 | 15.40                      | 1: 5.4           |
| 6. Fattening oxen, 1st period, . . .          | 27.0                     | 2.8                                | 15.0           | 0.50 | 18.00                      | 1: 6.5           |
| "    "    2d    "    . . .                    | 26.0                     | 3.0                                | 14.8           | 0.70 | 18.50                      | 1: 5.5           |
| "    "    3d    "    . . .                    | 25.0                     | 2.7                                | 14.8           | 0.60 | 18.10                      | 1: 6.0           |
| 7. Fattening sheep, 1st period, . . .         | 26.0                     | 3.0                                | 15.2           | 0.50 | 18.70                      | 1: 5.5           |
| "    "    2d    "    . . .                    | 25.0                     | 3.5                                | 14.4           | 0.60 | 18.50                      | 1: 4.5           |
| 8. Fattening swine, 1st period, . . .         | 36.0                     | 5.0                                | 27.2           |      | 32.50                      | 1: 5.5           |
| "    "    2d    "    . . .                    | 31.0                     | 4.0                                | 24.0           |      | 28.00                      | 1: 6.0           |
| "    "    3d    "    . . .                    | 23.5                     | 2.7                                | 17.5           |      | 20.20                      | 1: 6.5           |
| 9. Growing cattle:                            |                          |                                    |                |      |                            |                  |
| Age, months.    Average live weight per head. |                          |                                    |                |      |                            |                  |
| 2-3          150 lbs. . .                     | 22.0                     | 4.0                                | 13.8           | 2.0  | 19.8                       | 1: 4.7           |
| 3-6          300 " . . .                      | 23.4                     | 3.2                                | 13.5           | 1.0  | 17.7                       | 1: 5.0           |
| 6-12        500 " . . .                       | 24.0                     | 2.5                                | 13.5           | 0.6  | 16.6                       | 1: 6.0           |
| 12-18        700 " . . .                      | 24.0                     | 2.0                                | 13.0           | 0.4  | 15.4                       | 1: 7.0           |
| 18-24        850 " . . .                      | 24.0                     | 1.6                                | 12.0           | 0.3  | 13.9                       | 1: 8.0           |
| 10. Growing sheep:                            |                          |                                    |                |      |                            |                  |
| 5-6          56 lbs. . .                      | 28.0                     | 3.2                                | 15.6           | 0.8  | 19.6                       | 1: 5.5           |
| 6-8          67 " . . .                       | 25.0                     | 2.7                                | 13.3           | 0.6  | 16.6                       | 1: 5.5           |
| 8-11        75 " . . .                        | 23.0                     | 2.1                                | 11.4           | 0.5  | 14.0                       | 1: 6.0           |
| 11-15        82 " . . .                       | 22.5                     | 1.7                                | 10.9           | 0.4  | 13.0                       | 1: 7.0           |
| 15-20        85 " . . .                       | 22.0                     | 1.4                                | 10.4           | 0.3  | 12.1                       | 1: 8.0           |
| 11. Growing fat pigs:                         |                          |                                    |                |      |                            |                  |
| 2-3          50 lbs. . .                      | 42.0                     | 7.5                                | 30.0           |      | 37.5                       | 1: 4.0           |
| 3-5          100 " . . .                      | 34.0                     | 5.0                                | 25.0           |      | 30.0                       | 1: 5.0           |
| 5-6          125 " . . .                      | 31.5                     | 4.3                                | 23.7           |      | 28.0                       | 1: 5.5           |
| 6-8          170 " . . .                      | 27.0                     | 3.4                                | 20.4           |      | 23.8                       | 1: 6.0           |
| 8-12        250 " . . .                       | 21.0                     | 2.5                                | 16.2           |      | 18.7                       | 1: 6.5           |

The carbohydrates cannot restore the worn out muscles or membranes of the animal any more than coal can be made to renew the used up packing, bolts, valves, flues, and gearing of a steam engine. The albuminoids are to the ox or the man what brass and iron are to the machine, the materials of construction and repair.

The carbohydrates are, furthermore, to the animal very much what coal and fuel are to the steam engine. Their consumption generates the power which runs the mechanism. Their burning (oxidation) in the blood of animals produces the results of life just as the combustion of coal in the fire-place of the steam engine produces the motion and power of that machine.

There is, however, this difference between the engine and the animal. The former may be stopped for repairs, the latter may run at a lower rate, but if it be stopped it cannot resume work. Hence the repairs of the animal must go on simultaneously with its wastes. Therefore, the material of which it is built must admit of constant replacement, and the dust and shreds of its wear and tear must admit of escape without impeding action.

The animal body is as if an engine were fed with coal and water not only, but with iron, brass, and all the materials for its repair, and also as if the engine consumed its own worn out parts, voiding them as ashes or as gas and smoke. The albuminoids, or blood and tissue-

formers, are thus consumed in the animal, as well as the carbohydrates, or fuel proper. The fact that the albuminoids admit of consumption implies that when the carbohydrates or proper fuel are insufficient, they, the albuminoids, may themselves serve as fuel. Such is the case, in fact. But, nevertheless, the two classes of substances have distinct offices in animal nutrition, and experience has demonstrated what science predicted, viz.: that for each special case of animal nutrition a special ratio of digestible albuminoids to digestible carbohydrates is the best and most economical, and, within certain limits, is necessary."

**Feeding Value of Different Articles of Food, etc.**—The following table, giving the average composition, digestibility, money value, etc., of different articles of food as given by Dr. Wolff, will, in connection with the previous table, be of value to the farmer in determining the kind and amount of feed for different farm animals.

AVERAGE COMPOSITION, DIGESTIBILITY, AND MONEY VALUE OF FEEDING STUFFS, AS GIVEN BY DR. WOLFF.

|   | Water. | Ash. | Nitrogenous Matters,<br>Albuminoid and Amides. | Fiber. | N. fr. Extract. | Fat. | Digestible<br>nutrients. |                               |      | * Nutritive Ratio. | Value.                     |                                    |
|---|--------|------|--|--------|-----------------|------|--------------------------|-------------------------------|------|--------------------|----------------------------|------------------------------------|
|   |        |      |  |        |                 |      | Albuminoids.             | Carbohydrates<br>incl. fiber. | Fat. |                    | Dollars per 100<br>pounds. | Comparison with<br>meadow hay = 1. |
| Meadow hay, poor, . . .                   | 14.3   | 5.0  | 7.5  | 33.5   | 38.2            | 1.5  | 3.4                      | 34.9                          | 0.5  | 10.6               | 0.48                       | 0.74                               |
| " " fair, . . .                           | 14.3   | 5.4  | 9.2  | 29.2   | 39.7            | 2.0  | 4.6                      | 36.4                          | 0.6  | 8.3                | 0.55                       | 0.86                               |
| " " average, . . .                        | 14.3   | 6.2  | 9.7  | 26.3   | 41.4            | 2.5  | 5.4                      | 41.0                          | 1.0  | 8.0                | 0.64                       | 1.00                               |
| " " very good, . . .                      | 15.0   | 7.0  | 11.7   | 21.9   | 41.6            | 2.8  | 7.4                      | 41.7                          | 1.3  | 6.1                | 0.74                       | 1.17                               |
| " " extra, . . .                          | 16.0   | 7.7  | 13.5   | 19.3   | 40.4            | 3.0  | 9.2                      | 42.8                          | 1.5  | 5.1                | 0.84                       | 1.32                               |
| Clover hay, average, . .                  | 16.0   | 5.3  | 12.3   | 26.0   | 38.2            | 2.2  | 7.0                      | 38.1                          | 1.2  | 5.9                | 0.69                       | 1.08                               |
| " " best, . . .                           | 16.5   | 7.0  | 15.3   | 22.2   | 35.8            | 3.2  | 10.7                     | 37.6                          | 2.1  | 4.0                | 0.88                       | 1.39                               |
| Timothy hay, . . .                        | 14.3   | 4.5  | 9.7  | 22.7   | 45.8            | 3.0  | 5.8                      | 43.4                          | 1.4  | 8.1                | 0.69                       | 1.09                               |
| Hungarian hay, . . .                      | 13.4   | 5.7  | 10.8   | 29.4   | 38.5            | 2.2  | 6.1                      | 41.0                          | 0.9  | 7.1                | 0.66                       | 1.04                               |
| Rye straw, . . .                          | 14.3   | 4.1  | 3.0  | 41.0   | 33.3            | 1.3  | 0.8                      | 36.5                          | 0.4  | 46.9               | 0.25                       | 0.55                               |
| Oat " " . . .                             | 14.3   | 4.0  | 4.0  | 39.5   | 36.2            | 2.0  | 1.4                      | 40.1                          | 0.7  | 29.9               | 0.44                       | 0.69                               |
| Rich pasture grass, . .                   | 78.5   | 2.2  | 4.5  | 4.0    | 10.1            | 1.0  | 3.4                      | 10.9                          | 0.6  | 3.6                | 0.27                       | 0.42                               |
| Average meadow grass,<br>fresh, . . .     | 70.0   | 2.1  | 3.4  | 10.1   | 13.4            | 1.0  | 1.9                      | 14.2                          | 0.5  | 8.1                | 0.22                       | .36                                |
| Green maize, . . .                        | 85.0   | 1.0  | 1.2  | 4.7    | 7.6             | 0.5  | 0.7                      | 7.4                           | 0.2  | 11.3               | .10                        | .16                                |
| Cured maize fodder, . .                   | 27.3   | 4.2  | 4.4  | 25.0   | 37.9            | 1.3  | 3.2                      | 43.4                          | 1.0  | 14.4               | .57                        | .91                                |
| Potatoes, . . .                           | 75.0   | 0.9  | 2.1  | 1.7    | 20.7            | 0.2  | 2.1                      | 21.8                          | 0.2  | 10.6               | .29                        | .46                                |
| Carrots, . . .                            | 85.0   | 0.9  | 1.4  | 1.7    | 10.8            | 0.2  | 1.4                      | 12.5                          | 0.2  | 9.3                | .18                        | .28                                |
| Mangolds, . . .                           | 88.0   | 0.8  | 1.1  | 0.9    | 9.1             | 0.1  | 1.1                      | 10.0                          | 0.1  | 9.3                | .14                        | .22                                |
| Rutabagas, . . .                          | 87.0   | 1.0  | 1.3  | 1.1    | 9.5             | 0.1  | 1.3                      | 10.6                          | 0.1  | 8.3                | .15                        | .24                                |
| Turnips, . . .                            | 92.0   | 0.7  | 1.1  | 0.8    | 5.3             | 0.1  | 1.1                      | 6.1                           | 0.1  | 5.8                | .11                        | .16                                |
| Sugar beets, . . .                        | 81.5   | 0.7  | 1.0  | 1.3    | 15.4            | 0.1  | 1.0                      | 16.7                          | 0.1  | 17.0               | .19                        | .30                                |
| Maize, German, . . .                      | 14.4   | 1.5  | 10.0   | 5.5    | 62.1            | 6.5  | 8.4                      | 60.6                          | 4.8  | 8.6                | 1.10                       | 1.73                               |
| " " American, . . .                       | 14.4   | 1.5  | 10.7   | 2.0    | 66.5            | 4.9  | 9.0                      | 63.3                          | 3.7  | 8.0                | 1.12                       | 1.75                               |
| Oats, . . .                               | 14.3   | 2.7  | 12.0   | 9.3    | 53.7            | 6.0  | 9.0                      | 43.3                          | 4.7  | 6.1                | .97                        | 1.53                               |
| Rye, . . .                                | 14.3   | 1.8  | 11.0   | 3.5    | 67.4            | 2.0  | 9.9                      | 65.4                          | 1.6  | 7.0                | 1.09                       | 1.68                               |
| Barley, . . .                             | 14.3   | 2.2  | 10.0   | 7.1    | 63.9            | 2.5  | 8.0                      | 58.9                          | 1.7  | 7.9                | 0.95                       | 1.47                               |
| Peas, . . .                               | 14.3   | 2.4  | 22.4   | 6.4    | 52.5            | 2.0  | 20.2                     | 54.4                          | 1.7  | 2.9                | 1.44                       | 2.25                               |
| Field Beans, . . .                        | 14.5   | 3.1  | 25.5   | 9.4    | 45.9            | 1.6  | 23.0                     | 50.2                          | 1.4  | 2.3                | 1.51                       | 2.36                               |
| Squashes, . . .                           | 89.1   | 1.0  | 0.6  | 2.7    | 6.5             | 0.1  | 0.4                      | 7.1                           | 0.1  | 18.4               | .08                        | .13                                |
| Malt sprouts, . . .                       | 10.1   | 7.2  | 24.3   | 14.3   | 42.1            | 2.1  | 19.4                     | 45.0                          | 1.7  | 2.5                | 1.31                       | 2.06                               |
| Wheat bran, coarse, . .                   | 12.9   | 6.6  | 15.0   | 10.1   | 52.2            | 3.2  | 12.6                     | 42.6                          | 2.6  | 3.9                | 1.04                       | 1.63                               |
| " " fine, . . .                           | 13.1   | 5.4  | 14.0   | 8.7    | 55.0            | 3.8  | 11.8                     | 44.3                          | 3.0  | 4.4                | 1.03                       | 1.62                               |
| Midlings, . . .                           | 11.5   | 3.0  | 13.9   | 4.8    | 63.5            | 3.3  | 10.8                     | 54.0                          | 2.9  | 5.7                | 1.07                       | 1.68                               |
| Rye Bran, . . .                           | 12.5   | 5.2  | 14.5   | 5.7    | 58.6            | 4.5  | 12.2                     | 46.2                          | 3.6  | 4.5                | 1.10                       | 1.72                               |
| Cotton seed cake decorti-<br>cated, . . . | 11.2   | 7.6  | 38.8   | 9.2    | 19.5            | 13.7 | 31.0                     | 18.3                          | 12.3 | 1.6                | 2.05                       | 3.22                               |
| Dried blood, . . .                        | 13.0   | 4.1  | 80.8   | ...    | 2.6             | 0.5  | 54.1                     | 2.6                           | 0.5  | ...                | 2.39                       | 3.76                               |
| Whey, . . .                               | 92.6   | 0.7  | 1.0  | ...    | 5.1             | 0.6  | 1.0                      | 5.1                           | 0.6  | 6.6                | .11                        | .18                                |
| Milk, . . .                               | 87.5   | 0.7  | 3.2  | ...    | 5.0             | 3.6  | 3.2                      | 5.0                           | 3.6  | 4.4                | .24                        | .53                                |

\* Nutritive ratios are read, 1: 10.6, 1: 8.3, etc.

Cattle should be fed several times a day, and at regular intervals. They should be given all they will eat, but not so much at a time that they will leave a large portion, and waste it, or render it unfit for food by breathing upon and working it over. What remains in the mangers can be swept out and used for bedding. Some farmers feed only three times a day, but many prefer to feed four or five times a day. No definite routine or system of feeding can be prescribed which will apply to all cases.

The practice of the writer is usually to feed twice in the morning, and once each at noon and night, the noon feeding frequently being done in the yard, when the cattle are let out for a little exercise.

Pure water should always be furnished in abundance at a place where all the cattle can have access to it. Never allow them to drink stagnant or filthy water, but keep the troughs and tanks for drinking purposes clean and well filled. These should be located in a sheltered place where all can have an equal chance, and the weaker ones may not be kept away by the stronger and ruling members of the herd. The more common practice among farmers of watering stock only once during the twenty-four hours is not to be recommended. All domestic animals should have plenty of water furnished them at least twice a day, and we think those animals thrive best that have access to it whenever they wish.

Cattle should also have a sufficient supply of salt. This is indispensable to their health and comfort, being not only a luxury, but a necessity to them. It is well to have a few quarts of salt kept in a box under a shed, to which they can have access whenever they wish. By this means they will eat little and often; but when they have not had the salt for a long time it is better to give them a small quantity of it every day until they become accustomed to it, before allowing them to take it whenever they wish.

**Soiling.**—The term "soiling" is applied to the cutting and feeding while green, such forage crops as may be profitably raised for the purpose. This system is practiced instead of pasturing in many sections, and has its peculiar advantages in localities where the latter method of management is inconvenient or unprofitable. While many farmers, having an abundance of good pasturage might find soiling unprofitable, there are others so situated that it would prove highly advantageous, and the profits of the farm be largely increased by its adoption.

It is admirably adapted to localities in the vicinity of cities and villages where pasturage is scarce and expensive, or to those farms where it is desirable to maintain a large number of cattle on a small area of land, and would prove more profitable under such circumstances than where the land is rich and cheap. Soiling has been practiced in Europe quite extensively, and also in this country considerably in certain sections during the past few years, the system, like all things new, gradually making its way against the opposition of the adherents of the older and common method of pasturing. Where conditions favor it, and when fairly tested, it is generally regarded as a great improvement over the ordinary system of management. It however requires considerable labor, foresight, and management in order to secure the best results.

With this method, arrangements must necessarily be made for enclosing the cattle in stables, sheds, or yards while being fed, as well as an enclosure near the former sufficiently large to admit of exercise in dry weather. The winter stables would of course be generally found most convenient and economical for this purpose, requiring no additional outlay in buildings or sheds. Some farmers use for this purpose open sheds with suitable racks or mangers.

**Advantages of the Soiling System.**—The advantages of soiling might be summed up in the following: By this means a large amount of dairy products is secured throughout the season, as an increased flow of milk is the result of this practice when properly

managed; provision is also made against the failure of pastures. It obviates one of the most expensive features of ordinary farming by the saving of fences, and prevents the seeding of weeds. It also saves land that may profitably be used for other purposes than pasturing, in those sections where land is valuable and expensive, since, with the same degree of fertility, considerably less than one-half the area of land will be required to yield an equal amount of forage crops to that which is fed from the grazing system. The cattle are protected and kept more comfortable in this way, and are prevented from tramping and wasting more fodder than they will eat. It more than doubles the amount of stock that may be kept on a given area of land, while there is a vast increase in the amount of manure that may be saved by this means, and which would be mostly lost by pasturage.

It requires some additional labor, but it is claimed by the advocates of the soiling system generally that the benefits derived are so much greater than from pasturing, that they more than compensate for the extra labor and care attending it.

**Objections to the System.**—The objections to the system of soiling that have been urged by its opponents are, that it requires considerable additional labor, close attention, and careful management. That during the hot weather, unless particular pains are taken to keep the stables clean, there will be a tendency to produce unsanitary conditions, not only among the cattle, but also in the dwellings that may be adjacent, the air becoming vitiated; that it is also more difficult to keep the milk sweet and free from taints.

In many parts of the country there is an abundance of pasture, while the owners of farms have at the same time all the land under cultivation that they can properly care for, and under such circumstances the adoption of the soiling system would render a portion of the land entirely useless. Besides, its adoption would bring the extra care and labor attending it into the season which, to the farmer, is the most busy of the whole year.

**Soiling and Pasturing Compared.**—The following experiment was made not long since by Mr. E. Brown, of Mankie, Scotland, a farmer of extensive operations, who was desirous of testing the comparative merits of soiling and pasturing cattle, the results of which, as will be seen, are considerably in favor of soiling.

In the spring he took forty-eight Aberdeenshire bullocks which had been wintered in his farm-yard, and separated them fairly into two equal lots, one of which he put to grass, while the other was soiled. The latter were fed on Swedish turnips until the clover was ready for cutting, and then the clover was given sparingly for a week, in order to avoid danger from over-eating, after which a full supply was allowed. The animals thrived exceedingly well until the grass got hard and withered. About the last of July, the clover having ripened, vetches were substituted, which were continued until the second crop of clover was ready for cutting. Ten of the soiled lots were sold in August, and the remainder of the two lots in September.

The results are thus stated: The forty-eight cattle cost in purchase and wintering, £503 2s. The best ten of the soiled lot sold at £17 5s. each; the remainder of the two lots sold at £14 5s. each; the soiled lot thus bringing £377, and the grazed lot £342, a difference of £35 in favor of the soiled cattle. It required one and three-quarters acres of Swedish turnips, eight acres of clover, and three acres of vetches, to furnish the food consumed by the twenty-four soiled cattle.

Mr. H. Stewart gives his opinion of the soiling system, the result of practical experience, as follows:

"The supposed large cost of soiling is the principal objection to the practice with most persons. It is useless to claim that it is not more costly than pasturing, so far as labor is concerned; but at the same time when well managed it is certainly more profitable. There are times and places in which it is more profitable to grow small crops with a small

expenditure of labor; and others in which it pays best to expend more labor and produce greater crops. It depends upon the amount invested in the farm and stock. If one cow can be pastured and fed on ten acres of land costing \$20 per acre, \$200 in all, and produces \$50 worth of milk in the year, then it pays to pasture and grow grass and corn for her feed. But if the land costs \$200 per acre, the cow must be fed from one acre or produce more than \$50 to be even with the other case. Now a cow cannot be fed on less than five to ten acres of land without soiling either partially or wholly. But by soiling, a cow can be fed the year through on two acres, and the income may be brought up to at least \$50 per acre. This is done by combining the production of some salable crops that will produce fodder as well, with the production of milk or butter, and by so utilizing the labor that as little as possible may be lost in this direction.

I have said that one boy can attend to forty cows. I repeat it. For two years I have soiled cows under somewhat unfavorable circumstances. My land was very poor—a run-down light soil. My only hope to make anything from it was to keep cows for the production of milk and butter, and make manure to enrich the soil, both to grow feed for the cows and market crops for sale. Being within easy distance of the New York market there could be no better situation for such an enterprise. I kept fifteen cows. Besides the fifteen cows there were three horses, seven heifers, and one bull, and some pigs. All the cleaning, feeding, and attendance on these animals was done by one boy of fourteen years, for one year, and the boy had considerable time to spend in field work. On this result I base my statement that one boy can attend to forty cows. But to do this, there must be convenience of arrangement and labor-saving methods.

I will begin with the morning work of the boy referred to, and follow it through the day. At half-past four or five in the morning he cards and brushes off the loose dirt from the fifteen cows, which is an easy job as they are well bedded and lie upon a raised platform with a gutter in the rear to receive the droppings. Any manure or fouled litter that may be on the platform is drawn into the gutter with a broad hoe, to leave everything clean for the milker. Before he has finished, milking has begun at the other end of the stable. The boy then washes his hands in a bowl kept for the purpose in the stable, and helps to milk. In one hour the milking is done; the boy helps to carry the milk to the milk-house, and returns to the stable and feeds the cows.

The feed is already in the feed passage, if it is the summer time, and five minutes is ample time to do this job. One hour will then have elapsed, and while the cows are feeding the boy goes to breakfast. After breakfast he returns to the stable, pumps water from the spring into the water trough, and turns the cows into the yard to the water. The horses are then cleaned and harnessed; the yearlings and bull are fed and watered; the stable cleaned out, and another hour is thus used up.

About half-past eight he will be on his way to the field with the one-horse wagon, where he hitches on to the mower and cuts feed for the next day, leaving it on the ground; he then gathers up and loads what was cut the previous day, and brings it to the barn. It is now 10 o'clock, and the boy will clean out the horse stable and pig-pen, and wheel the manure into the basement under the cow stable, and spread evenly. He may then give the cows some fodder in the yard, and do odd jobs until dinner time. After dinner he goes to the field and works there until half-past four, when he returns to the stable, feeds the cows there, and gets ready for milking about 5 o'clock. Calves and pigs are fed, and such preparations as may be necessary are made for the next morning's work, and at 6 o'clock the day's work may be finished. After supper the stable is visited and the cows are fed again, which is about five minutes' work, and that ends the day.

It can be readily seen that to prepare the feed in the winter will be very little more work than in the summer. There are roots to cut, hay or corn fodder to cut; feed to

prepare; but it will take no more time to do this in the barn than to do similar work in the field. I think perhaps that those who know something of this kind of work, and how much time will be required, will readily believe, with a little help perhaps in the field, that a smart boy, who has nothing else to do, may feed and keep clean forty cows, kept in this manner. It is true that on a compact farm of sixty acres there will be less time lost in going back and forth from the stables to the fields than on a larger farm; but allowances of this kind are easily made.

In my own case, the practice of soiling has grown out of peculiar circumstances, and to give a minute statement would be misleading, and not nearly so favorable to the practice as it should be. My farm has been to a large extent an experimental one. Much land, fertilizers, and labor have been given for the purpose of experiments. Different kinds of cows have been kept for comparison, various feeds have been used, various implements have been tested; experiments in dairying and its effects have been made; but so far as the main business, the production of milk, butter, and some market crops is concerned, I am free to say that without the money made in that way I could not very well have paid my way in my other work. Generally, however, the results of my work are sufficiently clear and certain to show to me, and I think to other practical persons, that the labor involved in the practice of soiling is by no means so large as is generally supposed, and that in certain cases it may be made very profitable."

In adopting the soiling system, or any other method of practice, the farmer should first take into consideration the circumstances and conditions by which he is surrounded, the advantages to be gained, and difficulties to be met. While some farmers might make it very profitable, others might not; therefore a careful deliberation should first be given the subject, and the special circumstances and surroundings be fully considered. It is always a good plan to make such a change gradually, carefully testing the merits of the system before fully adopting it.

Soiling will frequently prove very advantageous to the farmer in connection with maturing stock, since it provides for a supply of food against the time of drouth and when the pastures begin to fail. The amount of forage to be cultivated to supplement the pasturage would not be proportionally large in such cases, and would almost invariably abundantly repay the labor attending it.

**Crops for Soiling.**—The principal crops used in soiling are clover, Indian corn, rye, and various other grains, grasses of different varieties, branching sorghum, and amber cane, millet, lucerne or alfalfa, common clover, alsike clover, the cow pea, and roots of various kinds, such as beets, turnips, carrots, etc. Broom corn has also been utilized with profit in this manner, after the brush has been cut off. As the seed is not allowed to ripen before the brush is harvested, the stalks are still tender and juicy, and if cut at once make quite nutritious forage. The stalks should be passed through a corn stalk cutter and mixed with a little bran, meal, or shorts before being fed. Sorghum and amber cane are preferred by many to sweet corn, since they produce nearly the same weight as the latter and are more nutritious.

The forage crop most extensively used in soiling is perhaps corn. It is not of course the most nutritious food, but the amount produced is so very large that the quantity fully makes up whatever deficiency there may be in quality. Nearly all the varieties of corn are used for this purpose, the sweet corn cultivated in gardens being generally preferred. It is more nutritious than the common field cultivated varieties, and the entire stalk much sweeter. The large gourd seed varieties of the common kind produce a much larger stalk when in tassel than the smaller varieties, but it is more coarse in fibre, and not as nutritious as the latter.

Some farmers who practice soiling are quite partial to the flint and smaler dent varieties.

Corn may be sown in drills or broadcast, the former method being usually considered the most desirable. The drills should be about three feet apart, using about a bushel of good seed to the acre. When the ears reach the milk state, the fodder is in the best condition for feeding; but it may be fed at any time after it has reached the height of three or four feet. Clover is best cut in the blossom; the same is true of most of the grasses and grains, as they are then moist, nutritious, and full of sap. They can, however, be cut at any season when necessary. They should always lie sufficiently long after cutting to become slightly wilted before feeding. Care should be used not to feed too much clover at a time, or, in fact, any green food. It is the practice of some to cut and mix one-fourth the quantity of cut hay or straw with green clover before feeding.

**Methods of Soiling.**—The methods of soiling are various, being modified by the feeder to suit different conditions and circumstances. As an illustration of this system, we give the method recommended by Mr. Waring, as follows:

“Early in the autumn sow three acres of winter rye, to be cut from May fifteenth to June fifteenth. Early in April, sow three acres of oats, to be cut from June fifteenth to July first; sow in April two acres of oats or barley, to be cut from July first to July fifteenth; early in May, two acres of oats or barley, to be cut from July fifteenth to August tenth; middle of May, two acres of corn, to be cut from August tenth to September first; middle of June, the three acres from which rye has been cut, to be sown with corn, to be cut from September first until September twentieth; early in July, the first three acres sown with oats should be resown with barley, to be cut from September twentieth until the harvest of roots and cabbages furnish a stock of green refuse, which will suffice until winter feeding commences.”

The plan as above makes an allowance of twelve acres for maintaining twelve cows, and requires the cultivation of root crops aside from the regular operations of soiling. The roots cultivated are not intended for feeding until winter, but the tops make excellent soiling forage late in the fall. This is a larger allowance, on account of poor soil, than is commonly made; but if the season be good the surplus may be ensilaged or dried for winter feeding, while the large allowance provides against a possible drouth or any other unfavorable circumstance that might reduce the ordinary quantity of food. In September three acres of the four which were sown to oats or barley and corn may be sown to winter rye. This provides for the early crop for soiling the next year.

Mr. Quincy of Massachusetts, who was an earnest advocate of the system, and who probably did more to popularize it than any other man in his day, who also practiced it with great success upon his farm, states that he was enabled by soiling to keep thirty cows on the product of seventeen acres of his land, but which under the old system required fifty acres. This gentleman relied chiefly upon four kinds of green crops for carrying on the system, viz.: grass, oats, Indian corn, and cabbage. Grass was depended upon for the first month of the soiling season, it being cut from the earliest patches here and there about the farm buildings. He gives as the result of his experience, that one acre of good clover is sufficient to sustain six growing cattle from the twentieth of May to the twentieth of June. Oats were used for soiling in July at the rate of one acre for every four cattle soiled. The oats were sown as early as possible in the spring, and were generally sufficiently advanced to commence feeding by the first of July.

When oats are to be depended upon alone during this month, Mr. Quincy advises that one-half the quantity sown be put in the ground a week or ten days later than the early seeding. Indian corn was used in the month of August. During September, grass from the second crop was depended upon from those acres which supplied soiling material in the month of June. He states that the grass from the second crop will generally enable the farmer to carry on the soiling system to the fifteenth of October, if his grass land is in good condition.

From the fifteenth of October until the cattle are sheltered for the winter, the tops of vegetables, such as carrots, beets, turnips, etc., are used together with cabbages. The food was distributed in racks under cover in the barn regularly six times a day. Although feeding a less number of times is practiced by many, there are strong arguments in favor of numerous feedings. Less food will be given at a time, and it will always be fresh and in the best condition to be eaten. Like all other departments of farming, the system of soiling should be adapted to the conditions under which it is to be practiced, since no one method could be devised to apply alike to all localities and circumstances. The cow pea makes an excellent soiling crop in sections suited to its successful cultivation, while the same is true of alfalfa or lucerne. In soiling, the food should be slightly salted about twice a week.

**How to Determine the Age of Cattle.**—Where cattle have horns, their age may usually be determined by these; but in hornless breeds the marks indicated by the teeth are the only means by which the age of the animal may be ascertained. Up to seven or eight years, the ages of cattle may be told with considerable accuracy by the number of rings at the roots of the horns. Steers, and heifers that are not breeding, show their first ring when three years old. When heifers breed at two years, it is found that they generally show a ring during that time, although there are some exceptions. The common rule for determining the age of cattle is, therefore, the appearance of one ring at the base of the horns at three years of age, two rings at four years, three at five, four at six, and five at seven, a ring being added yearly after the third year up to seven years.

As we advance beyond seven years, the rings become more or less distinct, and cannot be relied upon with any certainty. The short horns of bulls seldom indicate age with as much accuracy as those of oxen or cows. It not unfrequently happens that unprincipled dealers in cattle, as in horses, sometimes erase the age marks in order to make the animal appear younger than it really is. In cattle it is done by scraping off with a sharp knife one or more rings from the horns. Youatt has given such a reliable and definite description of the appearance of the teeth of cattle at different ages, that we extract it entire:

"The mouth of the new-born calf presents an uncertain appearance, depending on the mother having exceeded, or fallen short of the average period of utero-gestation. Sometimes there will be no vestige of teeth, but generally, either two central incisors will be protruding through the gums, or they will have arisen and attained considerable bulk.

At the expiration of the third week the animal will have six temporary incisors or front teeth.

At a month, the full number of incisors will have appeared. These are the temporary or milk teeth. The enamel will be seen covering the whole of the crown of the tooth, but not entering into its composition as in the horse, and it will be observed that the edge is exceedingly sharp. The only indication of increasing age, will be the wearing down of these sharp edges, and the appearance of the bony structure of the tooth beneath. The two corner teeth will be scarcely up before the center teeth will be a little worn.

At two months, the edge of the four central teeth will be evidently worn; yet, as the wearing is not across the top of the tooth, but a little out of the line of its inner surface, the edge will remain nearly or quite as sharp as before.

At three months, the six central teeth, and at four months the whole set will be worn, and the central ones most of all; but after the second or third month, the edge of the tooth will begin to wear down, and there will be more of a flat surface, with a broad line in the center.

About this time a new change will begin, but very slowly, to be sure. The central teeth will not only be worn down on their edge, but the whole of the tooth will appear diminished; a kind of absorption will have commenced. There will be a little, but increasing space between them. The face of the tooth will likewise be altered, the inner edge will be

worn down more than the outer, and the mark will change from the appearance of a broad line to a triangular shape. The commencement of this alteration of form, and diminution of size, may be traced to about the fourth month. The central teeth are now not above half the size of the next pair, and they are evidently lessened.

At eleven months, the process of diminution will have extended to the four central teeth. The vacuities between them will now be evident enough.

At fifteen to eighteen months old, from the curious and diminutive appearance of all the incisors of a bullock of that age, we should think it difficult for him to obtain sufficient food to support himself in good condition.

It is somewhat so, and it may be in a great measure owing to these changes in the teeth, and the difficulty of grazing, that young beasts are subject to so many disorders from seven or eight months and upwards, and are so often out of condition. They contrive, however, to make up for this temporary disadvantage by diligence in feeding; and, to allude for a moment to another animal, we have known many, not only a broken-mouthed, but a toothless ewe thrive as well as any of the flock, for she was grazing all the day, and ruminating all night.

At this time, eighteen months old, the corner teeth will not be more than half their natural size; the center ones will be yet more diminished, and the vacuities between them will be almost equal to the width of the teeth. The faces of the teeth also, such faces as remain, will be lengthened; the triangular mark will diminish, and principally in the central teeth; while another, more or less deeply shaded, will begin to appear around the original mark.

All this while, the second set of teeth, the permanent ones, have been growing in their sockets, approaching towards the gums; but not as is said to be generally the case with other animals, and with the human being in particular, pressing upon the roots of the milk teeth, and causing them to be absorbed, until at length, losing all hold in the socket, they fall out. The process of absorption commences here in the whole milk-tooth, and as much in the crown or body of it, as at its root.

The process of general diminution seems now for a while retarded; it is confined to the central teeth, and they gradually waste away until they are no larger in the body than crow-quills. About the expiration of the second year, or a little before, the milk-teeth are pushed out, or give way, and the two central permanent teeth appear.

*At two years old*, then, there are two central permanent teeth, with six diminutive milk-teeth remaining; three on either side of the central permanent ones.

*At three years of age*, cattle have four central permanent teeth, with four milk teeth remaining; two on either side of the four central ones. The third pair are now getting ready, but the jaw is not yet sufficiently widened for the development of the fourth pair.

Now the remaining milk teeth will diminish very fast, but they show no disposition to give way, and *at four years old* there will be six permanent incisors, and often apparently no milk teeth, but if the mouth is examined, the tooth that should have disappeared and the tooth that is to remain until the next year, are huddled together and concealed behind the new permanent tooth. They are often a source of annoyance to the animal; and the tooth whose turn it was to go must be drawn. The four year old mouth, then, should contain six permanent incisors and two milk teeth.

*At the commencement of the fifth year*, the eight permanent incisors will be up; but the corner ones will be small. The beast, however, cannot be said to be *full-mouthed*, i. e., all the incisors fully up, until it is six years old. It will be seen, though, by examining the mouth of five years, that the two central pairs are beginning to be worn down at the edges, and that in a flat direction, or somewhat inclined towards the inside.

*At six years old*, the teeth are fully grown, but this mark has extended over the whole

set, and all the teeth are a little flattened at the top; while on the two center ones there begins to be a distinct darker line in the middle, bounded by a line of harder bone.\*

From this time the age can only be guessed at, and not decidedly affirmed; and a great deal will depend upon the manner in which the animal is fed. The beast that is most out, and that is compelled most to use his incisor teeth, will have them worn farthest down.

Perhaps, as a general rule, but admitting of many an exception, it may be said that at seven years old, this line is becoming broadest and more irregular in all of the teeth; and that a second and broader, and more circular mark, appears within the center of the former one, and more distinct in the central or two central pairs—and which at eight years has spread over the six central incisors.

A year afterwards, however, a change takes place which cannot be mistaken. The process of absorption has again commenced, and precisely where it did when the animal was four months old, viz., in the central incisors; but it is slow in its progress, and it is never carried to the extent to which we observed it in the milk teeth. It is, however, sufficiently plain, and the two central teeth are evidently smaller than their neighbors. A considerable change has also taken place on the surface of the teeth; the two dark marks are rubbed into one in all but the corner teeth.

*At ten*, the four central incisors are diminished in size, and the mark is becoming smaller and fainter.

*At eleven*, the six central ones are smaller; and *at twelve*, all of them are very considerably diminished; but not, as we have already observed, to the same extent as in the young beast. The mark is now also faint, or nearly obliterated, except in the corner teeth, and the inside edge is worn down to the gum.

The beast is now getting old; the teeth continue to diminish, and it is not often that the animal, after fourteen or sixteen years old, is able to maintain his full condition. He must then be taken up and partly fed in the stable: yet there are many instances in which favorite bulls have been kept until they were more than twenty years old; and we know a cow of the same age that pastures with the rest of the dairy, and gives a fair quantity of milk."

**Beef Production.**—The production of beef has become one of the leading agricultural industries of this country. Although it has long been an industry of great magnitude, it has developed to a remarkable degree since the export trade in meats was established. English authorities state that most of the live stock from the United States is superior in quality and condition to that imported from Holland and other parts of Europe, and that there is a juiciness and flavor about the beef, together with a desirable distribution of fat and lean, that are not wholly attainable except through the American system of full grazing. The British farmer, in fattening his beef, is obliged to resort, in a great measure, to cultivated roots, oil cake, and other prepared food; but in this country, which is unexcelled for grazing, there is an abundance of the best grasses and grains, and the "forcing" process in fattening by the free use of the latter, need not be resorted to, except a comparatively short time previous to marketing. The exports in beef and its products alone during the past year were upwards of fifty millions dollars; and when we take into consideration also the vast amount required for home consumption, we shall be able to form something of an estimate of the magnitude of the beef-producing enterprise in this country. The success of beef production

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\* "We are perfectly aware against what authority we are contending, when we thus compute the age of cattle by the appearance of the teeth. The pleasing author of the 'Illustrations of Natural History,' gives the beast a full mouth at three years old, and so does Buffon, and the editor of the Encyclopedia Metropolitana. Mr. Parkinson says that the mouth is full at four, although he acknowledges that the teeth are not perfectly up until the animal is six years old. We have no hesitation, however, in appealing to the experience of the breeders of cattle for the general accuracy of our account."

depends largely upon the breed and locality. With beef herds, as with those for the dairy, the best for the purpose and locality should be selected. It costs no more to fatten a good animal than a poor one; in fact, it costs less to fatten a well-formed animal that is capable of laying on fat and flesh readily than it does to fatten one that is coarse boned and ill-formed.

It is therefore of the highest importance that a beef animal have the proper form for furnishing the largest possible amount of meat for the "best cuts" at the butcher's block, with the least waste. Beef animals should consequently have large, compact, and block-shaped forms.

Early maturity is also an essential point in the selection of cattle for beef production. There is a great difference in breeds in this respect; some will mature into good beef animals only when five or six years old, while others will be well matured at from three to four years. It requires no argument to show that the latter must be much more profitable than the former for either the grazier or stall feeder, since the sooner the animal is fitted for the market, the less the expense, and consequently the larger the profits. Some farmers seem to regard an ox or cow as such simply, without any regard to characteristics, and we occasionally hear the remark, though not often in this enlightened age, that "one breed is as good as another." If, in the light of all the experience and observation that are attainable on this subject, any individual persists in carrying out in practice what is asserted in the above words, he must expect to take the consequences in little or no profit, as the result of his ignorance and stupid obstinacy. It is highly important that cattle intended for beef, as well as for other purposes, should be *well fed from birth, and kept growing*. A calf that is stunted and starved during the first year of its life will never attain the size of one that is well fed, no matter how generous the feeding may be afterward, neither will it furnish beef of as good quality as the latter. Proper form and size, rapid growth, and early maturity are important items in beef production. Spayed heifers will fatten at two years, and attain large size and heavy weight, but it is a cruel practice, and one that we would not recommend; besides there is danger of losing the animal, spaying not unfrequently being followed by the death of the heifer.

As has been stated in previous pages of this work, the best beef breeds, and consequently the most profitable for beef production, in sections to which they are adapted, are the Short-Horns, Herefords, and Devons, as they seem to combine more than any other, the chief characteristics essential in an animal for this purpose. There are of course other breeds that make excellent beef, and may be profitably used for this purpose, but the above-mentioned are by common consent acknowledged to be most desirable, where beef production alone is the object. What is applicable to these breeds is also applicable to their grades, and the higher the grade the better will the animal be, other conditions being equal.

**Feeding Beef Cattle.**—It is found that variety in the food of cattle, as well as other domestic animals, is the necessary requirement for the highest success in rearing and fattening them. Although quite good beef may be made from grass-fed animals, where there is an abundance of succulent grasses, yet the best beef is that produced by a mixture of grass and grain. A suitable amount of grain fed in summer in connection with the grass will cause a more rapid growth of the animal, and expedite early fattening when placed in the stall, providing stall-feeding is practiced: or if not, will hasten the fattening process in a corresponding degree, if fitted for market in the field. The addition of a few pounds of corn per day to each steer while at grass would all be utilized in laying on extra fat, and also have a tendency to improve the quality of the beef for fall shipment by giving more solidity to the flesh, hence there would be less shrinkage when weighed by the purchasers.

The English, in feeding Indian corn, give with it from four to eight pounds of oil-cake per head, in order to balance its carbonaceous character with albuminoids. Eight pounds of corn, however, with a dozen or more varieties of grass in pasturage, is a much better food

combination than that of the English. Besides, this small amount of grain with the grass in the warm season will produce a much greater effect in fattening the animal than if fed in cold weather. Grass is good for a basis, but needs the grain in addition to give it staying qualities and so make a complete food combination.

Upon this point a leading authority in this country says: "Another important consideration is seen in the fact that the grain renders the flesh more solid — containing less water or more dry substance — and, in consequence of this condition, steers so fed will lose much less on being taken from pasture for stall feeding in the fall, or for shipment to market. All observing feeders know that steers taken from a good pasture must be fed in stall for some time without much increase in weight, as the sap, or extra water in the carcass is being replaced by fat made from grain, and the steer may be doing well for thirty or more days with but little increase in weight. But when grain is fed with pasture, this shrinkage does not occur on being put up in the fall for stall-feeding. On the same principle, cattle stall-fed through the winter, when taken to good pasture in spring, will increase in weight very rapidly by the addition of sap, or water to the carcass. We have known such steers to gain five pounds per day for fifteen days after being taken to pasture.

We know that some good feeders are averse to feeding grain with pasture, because they think the steers depend too much upon the grain, and do not eat so much grass. But we think their error has been occasioned by not considering the effects of grain feeding upon the quality of the increase in weight. In the West, where corn is cheap, it appears evident to us that a small grain ration with pasture will pay twenty-five per cent. better for the grain than the same amount fed in cold weather."

In out-door fattening, it is a good plan to feed corn in the stalk just as it is cut in the field and stacked. By this means the corn leaves, ears, husks, and stalks are eaten together, forming a more perfect food than corn alone; besides the labor of husking is saved.

Good hay is excellent food for all stock, being nutritious and producing a healthful distention of the stomach, but no animal can fatten on hay alone. A variety of food is best for animals in all conditions. By consulting the table on a previous page, giving the feeding value of different articles of food, average composition, etc., the comparative fattening value of various kinds of food can be determined. Whatever the rations may be for beef animals, they should be supplied with plenty of pure water at all times.

**Flavor of Beef.**—That the food consumed by animals affects their flesh, is a fact too well authenticated to be denied. We are all familiar with the fact that chopped onions fed to fowl in sufficient quantities will flavor not only the flesh, but the eggs of the fowl that are produced while being thus fed, or shortly after. Pork will take a peculiar flavor from the food upon which the pigs have been fattened, such as acorns and beech nuts. When butchered while feeding upon these nuts, the pork will be oily and have their flavor. If however, such pigs are put in a pen for a few weeks before being butchered, and fed upon corn or other grain, this peculiar flavor will be exterminated, and that of grain-fed pork remains. Fish scraps, and the refuse of the slaughter-house, when used for fattening, give pork a very disagreeable flavor, unless the fattening process is completed by feeding upon corn or other grain.

Water fowls fed upon fish have also the flavor of fish. The flesh of the wild deer has a peculiar piquant flavor, relished by epicures, and which comes from the wild, aromatic herbs on which it subsists in a wild state; but when the wild deer is domesticated, and fed upon cultivated grasses and other kinds of food, its flesh will lose this peculiar flavor in the second generation.

M. Monclar, a French agriculturist of note, after experimenting with different combinations of food, states that any flavor desired can be given to the flesh of cattle, sheep, pigs, and poultry.

He mentions, as the result of his experiments, that poultry fattened upon a small admixture of chopped truffles with other food, will have a finer flavor than those chickens that have been stuffed or larded with truffles preparatory to cooking; the argument being that the truffles eaten by the chickens permeate the whole system, flavoring the meat, which is not the case when they are placed in the dressed carcass of the fowl. He also gives instances in which the flesh of larks shot in a cabbage field, hares killed in a wormwood field, and eggs laid by hens which had eaten diseased silkworms, had such a nauseous taste that no one could eat them; while tame rabbits which are fed upon the waste of anise-seed in barley and bran, and others with the food flavored slightly with the essence of thyme, had a much finer flavored flesh than those fed in the ordinary manner. He found the same true also of ducks and fieldfares which had been fed upon sprigs of juniper.

These facts all prove clearly that the food of all animals permeates the whole system and largely influences the quality of the flesh. This being a fact, it is important that the kind and quality of food given domestic animals that are designed as food for mankind, should receive more careful attention than is sometimes given to this important branch of farming. It also gives the opportunity for testing the skill of the feeder, in furnishing those combinations of food that will produce meats of not only good quality, but of fine flavor.

**Marbled Beef.**—The best means of producing that quality of meat known as "marbled beef," which is characterized by a desirable mingling of fat and lean, is at present claiming the attention of breeders of stock for beef production and is the subject of much discussion. Some claim this quality to be inherent in the breed; others that it is the result produced by feeding, irrespective of breed. Although some breeds, with suitable feeding, do excel others in this respect, yet it cannot be denied at the same time, that marbling is in a great measure contingent upon the character of the food given. In order to produce the best quality of beef, the food should contain the material for forming flesh, fat, bone, and muscle in proper proportions.

The rations therefore should consist of a variety of food, while the temperature, and the constitution of the animal, should also be considered. No animal that is not mature will marble well with fat. The extensive use of corn for fattening cattle, to the neglect of other food, cannot, in the nature of things, produce the best quality of beef. In such cases there will be a superabundance of fat in large masses, and not that intermingling of fat and lean which is seen in beef of the finest quality. The most successful English breeders claim that the finest quality, as well as the maximum quantity of beef, can be produced only by generous feeding from birth, not only to maturity, but to the butcher's block, while the food should at the same time consist of a variety. Nature has provided for this want in a great measure by the great variety of grasses furnished in our pastures. It is no uncommon thing to find from ten to fifty varieties of grasses growing in our common pastures, while some of our older grazing lands probably contain a hundred or more varieties, thus furnishing a ration to meet the different wants of the system.

Almost every article of food has some quality or combination of qualities in excess of all others, and if the practical feeder will inform himself as to the different kinds of food, he will soon learn to combine them properly in the rations for his stock. Young and tender grass contains a much larger proportion of albuminoids than that which is nearer maturity, and it has consequently been found that cattle will fatten more readily upon grass which is from two to four inches high, than upon that which is of larger growth. Long practice in feeding has established the fact of a certain relation between the amount and quality of food taken, and the gain in the weight of the animal. Dr. J. B. Lawes of Rothamstead, England, found after repeated experiments, that it required from twelve to thirteen pounds of the dry material of food, consisting of grain, roots, and hay, to produce an increase of one pound in live weight on full feed.

All dairymen know that the quality of the milk is dependent in a great measure upon the food provided for the cows, that while some breeds may be pre-eminently dairy breeds, and produce milk of a much richer quality, or more in quantity than some others, yet at the same time the value of any cow for milk production is largely dependent upon the quality and quantity of food given. If milk is dependent upon the food for its quality and flavor, the flesh of the animal must depend upon it fully as much, if not to a greater extent.

If we wish to improve the quality and flavor of the flesh, it can only be accomplished by improving the food and conditions. While much may depend upon the breed, blood does not comprise everything, and the quality of the beef will be found to vary according to the quality and amount of food given. Therefore the feeder's art is of quite as much importance as the breeder's skill, and the two must be combined to produce most economically the best beef.

Nothing is more certain than that the building materials for bone, muscle, and fat, are supplied by the food, for they cannot be created by the animal machine. The animal is simply the mill, and grinds the grist that is given it. Now, if we take Nature for our teacher, and give a proper combination of food, commencing with the young calf and feeding continuously and well (not over-feeding), on a variety of food until the animal is ready for the butcher's block, nicely marbled, first quality of beef, will be the result. Not the best Short-Horn or Hereford in the world, if left to shift for itself until three years old, and then forced into fatness, will or can produce good beef. It is not *breed* alone, but *breed and feed combined* that will result in the first quality of beef production.

**Average Age, Weight, and Gain of Beef Cattle Per Day.**—The following facts, which were recently obtained from careful experiments by reliable parties in one of the Western States, in feeding cattle of different ages, giving the exact age, weight, and gain of each, will be useful in showing to what an extent the profit of beef production lies in full feeding and early maturity. By consulting the table in which the animals are grouped as near as may be according to age, and observing the average age, weight, and gain per day, the law of growth will be at once apparent. The table is deficient in respect to not showing the amount of food consumed by each animal per day, yet as it stands, is of value in statement as far as it goes.

| 5 Steers —   |       |         |          | 4 Steers —            |       |         |          |
|--------------|-------|---------|----------|-----------------------|-------|---------|----------|
|              | Age.  | Weight. | Gain     |                       | Age.  | Weight. | Gain     |
|              | days. | lbs.    | per day. |                       | days. | lbs.    | per day. |
| No. 8.....   | 585   | 1240    | 2.11     | No. 1.....            | 1578  | 2240    | 1.42     |
| No. 16.....  | 612   | 1397    | 2.28     | No. 2.....            | 1593  | 2166    | 1.36     |
| No. 17.....  | 500   | 1114    | 2.23     | No. 14.....           | 1420  | 1979    | 1.39     |
| No. 26.....  | 605   | 1196    | 1.97     | No. 21.....           | 1573  | 2118    | 1.34     |
| No. 27.....  | 544   | 1300    | 1.38     |                       |       |         |          |
| Average..... | 569   | 1249    | 2.19     | Average.....          | 1541  | 2125    | 1.37     |
| 5 Steers —   |       |         |          | 4 Steers —            |       |         |          |
| No. 5.....   | 845   | 1636    | 1.93     | No. 11.....           | 1677  | 1930    | 1.15     |
| No. 6.....   | 814   | 1419    | 1.78     | No. 12.....           | 1689  | 1974    | 1.17     |
| No. 7.....   | 710   | 1316    | 1.87     | No. 20.....           | 1804  | 2134    | 1.18     |
| No. 15.....  | 939   | 1474    | 1.57     | No. 30.....           | 1643  | 2830    | 1.71     |
| No. 24.....  | 982   | 1532    | 1.64     |                       |       |         |          |
| Average..... | 848   | 1481    | 1.76     | Average.....          | 1708  | 2216    | 1.30     |
| 6 Steers —   |       |         |          | 3 Cows and 2 Steers — |       |         |          |
| No. 25.....  | 1059  | 1534    | 1.44     | No. 9.....            | 2035  | 1769    | 0.86     |
| No. 26.....  | 1284  | 1649    | 1.28     | No. 18.....           | 2049  | 1730    | 0.85     |
| No. 22.....  | 1294  | 1986    | 1.53     | No. 28.....           | 2309  | 2840    | 1.18     |
| No. 13.....  | 1359  | 1968    | 1.41     | No. 29.....           | 2404  | 2836    | 1.17     |
| No. 4.....   | 1311  | 2019    | 1.53     | No. 10.....           | 2341  | 1669    | 0.74     |
| No. 3.....   | 1335  | 2069    | 1.54     |                       |       |         |          |
| Average..... | 1240  | 1869    | 1.45     | Average.....          | 2225  | 2168    | 0.96     |

It will be observed that the average gain per day decreases as the animals grow older and heavier. The fifth group in the table has the average gain raised by the steer No. 30,

which seems to have been a remarkably fine animal, attaining the weight of 2,820 lbs. at four and a half years of age, and gaining .53 lbs. more per day than either of the others. It is quite probable that the second group were as thrifty and heavy at 569 days old as the first group, or that they weighed on an average 1249 lbs., gaining 2.19 lbs. per day; but in the next 279 days we find that they gain only 232 lbs., or .83 lbs. per day, which is only a little more than one-third of what they gained during the first period. Although the third group of steers were better for their age than the second, yet if we compare them with the first, we find them 671 days older than the latter, and their gain during this time to be 620 lbs., or .92 lbs. per day, which is considerably less than half of the gain of the first period. But this does not show the entire loss of feeding to such an age. If we had the actual weight of food consumed by the steers of the first group in making an average growth of 1,249 lbs., and also the food eaten by the third group reaching the weight of 1,869 lbs., we should doubtless find the live weight of the latter to cost in food from forty to fifty per cent. more than the former; showing that steers not only gain less per day as they grow older, but that they consume more food to make this small gain.

**Heavy Weight of Fat Steers.**—We have obtained from different sources the following unusual weights of fat steers, which may be of importance as showing what may be accomplished by judicious and skillful feeding. Mr. Geo. Ayrault, of Poughkeepsie, New York, sold a few years since, four steers which were seven-eighths Short-Horn and raised by himself, which weighed respectively, 3,440, 3,406, 3,320, 3,300 pounds each. The age of one of the animals was seven years, and another six. The largest stood nearly six feet high with a girth of ten feet, the proportions of each being good, notwithstanding their enormous size. The aggregate gain in weight during the season was 1,460 lbs. The net beef weight of the larger pair after slaughter was 4,537 lbs. Their average weight at three years was 1,850 lbs. After attaining this age, each animal received daily a peck of corn meal and wheat shorts, or oatmeal combined, divided into two rations followed by a peck of sugar beets twice a day. In summer their only feed was grass supplemented with a little hay. In the second winter the daily rations of meal were increased to ten quarts each, given in two feeds. During their last summer each received a peck of meal per day, given at morning and night, and in the winter following twelve quarts of meal daily in three rations, besides roots. In winter they also had the best of early cut hay from old meadows, and were closely confined, usually having the run of a small yard with access to water, and with sheds under which they could be protected from storms, being tied at feeding time.

The mammoth ox Columbus, seven years of age, is said to have attained the weight of nearly 4,000 lbs. His length from nose to rumps is recorded as eleven feet; girth eleven feet; height five feet, ten inches; horns from tip to tip, three feet and three inches. The Haxton steer is reputed to have weighed 3,452 lbs., while a pair of the Crystal Palace Show cattle dressed 4,100 lbs., one of them netting 2,173 lbs., and lacked but two pounds of making 72½ per cent. of the live weight.

Thatcher's Military Journal of the Revolution, under date of June 24, 1779, contains the following entry: "No. 2. I have just had the satisfaction of viewing a venerable large Fat Ox, which has been presented by some gentlemen in Connecticut to His Excellency Gen. Washington. He is 6 feet 7 in. high, and weighs, on the hoof 3,500 lbs.—the largest animal I ever saw."

The steer Gov. Morton is recorded as weighing 3,190 lbs.; Burnside, 2,870 lbs.; Nels. Morris, 2,840 lbs.; a one-year old steer, 1,338 lbs. A three-year old steer owned by J. D. Gillette, recently weighed 2,139 lbs., while three cows owned by other parties are credited to weigh respectively, 1,833 lbs., 2,042 lbs., and 1,936 lbs.

Such records are especially valuable as showing the great weight attained by beef cattle of different ages, and what may be accomplished in this respect. While large size and heavy

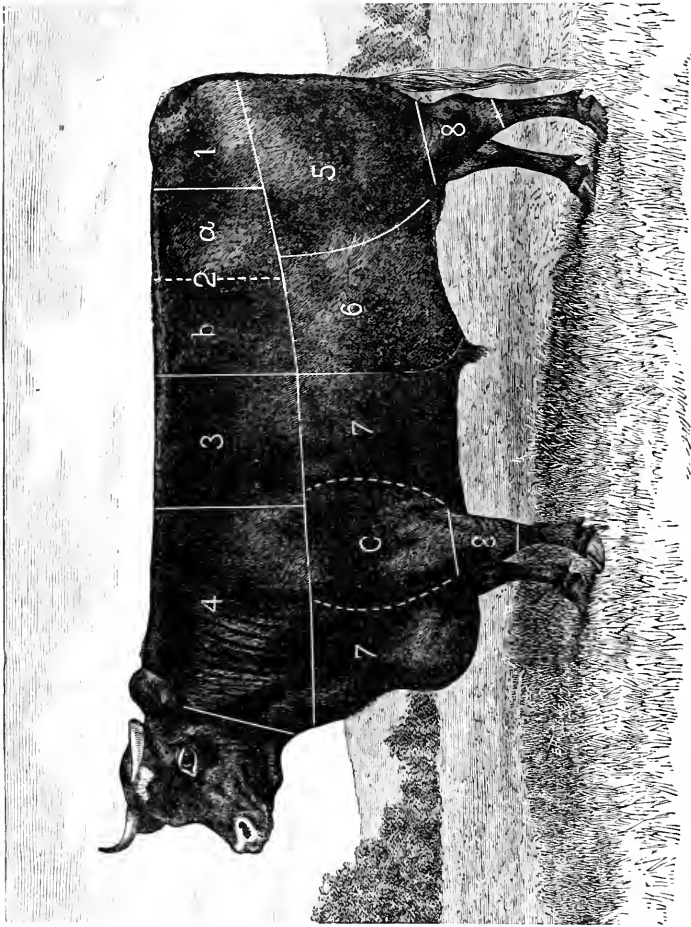


DIAGRAM FOR CUTTING A CARCASS OF BEEF.

weight are to be desired in cattle for the beef market, the quality of the beef produced is a more important consideration, and when that which is first-class in quality is combined with heavy weight in the animal, the breeder and feeder can truly be said to have attained the most economic and successful standard in beef production.

**Weighing with a Tape Line.**—It is sometimes convenient to be able to estimate the weight of cattle on foot when purchasing, where the means of obtaining the actual weight are not at hand. For doing this, the following method will be found serviceable, although of course only an approximation to the actual weight of cattle can be attained by the use of a tape line. See that the animal stands square, resting equally upon his four feet, then take his circumference just behind the shoulder blade, which is the girth. Then measure from the bone of the tail which plumbs the line with the hinder part of the buttock, directing the string along the back to the forepart of the shoulder blade; this will be the length.

These dimensions will then be used as follows: Assuming the girth of a steer to be six feet four inches, and the length five feet three inches, these multiplied together make thirty-three square superficial feet; and these multiplied by twenty-three (the number of pounds allowed for each superficial foot of cattle measuring less than seven, and more than five feet in girth,) makes 759 pounds. When the animal measures less than nine, and more than seven feet in girth, the rule is to allow thirty-one as the number of pounds for each superficial foot.

When an animal measures less than three feet in girth, the number of pounds allowed in weight for each square foot is eleven; for instance, if a small animal measures two feet in girth, and two feet in length, these two dimensions multiplied together make four square feet, which, multiplied by eleven, gives forty-four pounds as the approximate weight of the animal. When an animal measures less than five feet in girth, and more than three, the number of pounds allowed for each square foot of surface is sixteen. To illustrate, suppose a calf, or sheep to measure four feet six inches in girth, and three feet nine inches in length; these figures multiplied together make sixteen square feet, which multiplied by sixteen (the number of pounds according to the rule, which are allowed to each square foot), gives a weight of 256 pounds. The dimensions of all animals such as cattle, sheep, calves, and hogs can be taken in this manner, and the weight of the four quarters of the animal be very nearly ascertained, sinking the offal. A deduction is usually made for animals that are fat, of one pound in twenty; and for a cow that has had calves, one pound is allowed in addition to the one for not being fat, upon every twenty.

**How to Cut Up a Carcass of Beef.**—The accompanying diagram illustrates the manner in which a carcass of beef is cut up for the wholesale trade by butchers generally. It is somewhat difficult to show upon a flat surface the exact position of the lines, but to those at all familiar with the anatomy of the ox, the diagram will be sufficiently intelligible.

The parts are named as follows: 1, rump; 2, loin; 3, rib roast; 4, chuck; 5, round; 6, flank; 7, plate (with the dotted line enclosing *c*, the shoulder clod, taken off); 8, shank. The piece 2, the loin, is divided in the meat market into *a* and *b*, as shown by the dotted line in the diagram. From *a* is cut the "sirloin" steak, and from *b* the "porterhouse" steak.

**Training Steers.**—The best working oxen, and the most easily trained, are those that have been accustomed to be handled from birth, and made gentle by kind treatment. We have seen calves not three months old nearly as well broken as working oxen, and as obedient to every word and motion, the training having been accomplished by a boy who made them his pets, and without whipping or abuse of any kind. By commencing early with calves they can be taught, by kind and patient effort, to perform many things that would seem, from the natural intelligence of the ox, to be entirely beyond his comprehension, all of which shows

to what an extent their powers may be trained to the benefit and aid of man in laboring for him. For instance, oxen may be taught to sit up on their haunches like a dog; to balance each other on the ends of a plank, like children playing "see saw"; to jump over a stick at the word of command; kneel down; walk on their knees; lie down and get up at the signal; jump over a mate that is lying down, etc.

In training for labor, the best plan is to begin with the young calf, before he gets strong, or has learned the extent of his own strength. It may be well first to train each calf to be led by a rope, then with a light yoke of suitable size begin the work of teaching the juvenile pair the things it is desirable for them to know. In a short time, by a few trials accompanied with patience and gentleness, they will have learned the meaning of "whoa," "go on," "haw," and "gee." Do not try to teach them too much at a time, as this is confusing, but be sure they understand the first lesson before proceeding to the second. Teach the meaning of "whoa" first. A sensible, good-tempered boy who knows how to drive oxen can soon instruct the little fellows in all that it is necessary for them to know. Gentleness and kindness should always be the rule in managing such animals.

It will require this course of training for several days in succession, in order to have them understand well what is required of them. And this to be followed by practice every day or two for weeks, in order not to have them forget the lesson. Do not follow the training so long at a time, at first, as to worry them, but commence gradually and increase the time of practice as the training proceeds. The most difficult task of all, is to teach them to "back," as it is an unnatural thing for an animal to walk backward.

This requires much patience and persistence in some cases, and should be accomplished by gentle means, and without a blow from the whip. It must be borne in mind that to go backward is contrary to nature in steer or colt, and therefore the greater need of patient training to accomplish the object in view. Attempt but one thing at a time, and always accompany the word of command with the movement, making the necessary use of such motions with whip or stick as are known to all experienced drivers of oxen. When they have learned to obey all the directions in the yoke, a small cart can be attached (which should of course be very light), and they may be trained to draw it. They should never be allowed, however, to draw anything very heavy, for if overtasked at this age they may be permanently injured.

If steers two or three years old that never have been yoked or accustomed to be handled, are to be trained, it will be necessary to gentle them first by handling, patting them, and feeding from the hand, etc., by so doing quieting their fears of man. Feed and gentle them until they regard their trainer as their friend, and have no fear of him, before attempting to put on the yoke. When yoked, they may be driven with chain between two pairs of old, well-trained oxen. By this means they will become somewhat familiar with the routine of their new sphere of action, and be ready to take a lesson in advance. After driving well between the other oxen, let them next do duty ahead of them as leaders. It would be well to have a rope attached to the horns of the "near" steer, which the driver may make vigorous use of in teaching the steers the meaning of "whoa," "haw," etc. They may be taught to back by commencing with an empty cart on a slight descent, which will make it easy for them, afterward on level ground, or up hill until they will learn to back a heavy load. Always be sure that the yoke is made to set easy, and the bows well adjusted to the neck.

Young steers should not be expected to do hard work, and should never be put to it until at least four years old. Even when well trained, be in no haste to put them to the plow or cart, for this is severe work, and should be performed by older oxen. Overworking young steers has injured for life many valuable animals, with a consequent loss to the owner. When worked in a storm, cattle are liable to have sore necks. This may be prevented by

rubbing the parts with fresh lard or sweet oil where the yoke chafes. Never work an ox or a horse with a sore neck, but allow the animal rest until the sore is perfectly healed. Never shout at oxen as though they were deaf and it required the utmost power of the lungs to make them hear. It is amusing to see some farmers drive their oxen. We have seen drivers where the wonder was that they did not tire themselves out by their shouts and gestures, for they appeared to work harder in driving the team than the oxen did in drawing the load. Low, quiet tones are better than loud ones, at all times in securing the best results in drawing.

A Mr. White of Canada, who gained considerable celebrity in training oxen a few years since, and who trained a pair that were for some time on exhibition through the country, says respecting his method:

"The first thing necessary in training oxen is kindness, then patience. I began in November last, not knowing whether I could get my oxen taught in time for this season or at all, but I soon found them so tractable that my hopes began to be raised. It took me just a day to learn that it wasn't necessary to strike a blow or speak a word. The farmers who go along shouting at their oxen and goading them waste their breath and strength. A dozen yoke of oxen could be taught to draw a load a hundred miles without a word or blow. It is only necessary that the farmer should lead to show the direction, and the beasts, if they have been kindly treated and have an affection for their master, will do the rest. These oxen were trained by uniform kindness. A series of tricks in regular order was fixed upon, and I put them through every day. I was with them nearly all the time, and they followed me like two pet kittens. There was a ring in the stables where I taught them day by day. First, with food in my hands I got them to follow me around the ring in any direction I chose to take. In this way I got them to go along on their knees, and to waltz. What they knew when I got them had practically to be untaught, as it was all done by 'gee' and 'haw.' I found that they were quick of sight, and that, having taught them certain things, I needed after that to simply get where they could see me, and give them a cue by the motion of my body or my whip in a certain direction. In this way the waltz was taught, and when they go around the ring on their knees I keep ahead of them and they follow me."

Never load working oxen too heavily; if you do they will not have courage to take hold readily with energy when called upon by the driver. Never dull and discourage them with prolonged exertion with impossibilities. They should be generally fed with good hay and grain when on active duty, and always at regular intervals, morning, noon, and night. Great and permanent injury is the frequent result of light feeding, combined with the heavy work too often exacted from these patient and uncomplaining servants of man. Strength and spirit rapidly decline under the overworked, straining system, and soon nothing remains but a stupid, moping brute. The whip is needed to indicate the precise movement desired, and not—except in very rare instances—as a stimulant or means of punishment. Oxen cannot endure the heat as well as horses, and are liable to be overheated in the spring and hot summer weather. When once injured in this way, they rarely ever fully recover from the effects. Oxen should be groomed and well cared for, and their stables kept clean and comfortable. The ox is considered in his prime at five or six years of age, and continues to be equally useful until about nine or ten years old, but is seldom as active after the eighth year. It is generally considered better to fatten oxen at or before arriving at that age, and have younger ones take their places in the yoke.

**Cattle Herding, etc.**—It is probable that few persons outside the great cattle herding region of the Northwest have any definite idea of the vast numbers of cattle raised there, or the enormous amount of capital invested in stock not confined within the boundaries of farms, but which are herded summer and winter, subsisting upon the grasses and herbage of the extensive grazing lands of these plains. It is estimated that the almost boundless grazing

grounds of the United States contain 1,650,000 square miles, with over a billion acres, and quite a large portion of these lands is being utilized for herding cattle. The quaint, bony, and half-wild descendants of the original Spanish cattle soon overran the fertile plains of Texas and New Mexico, spreading northward to Kansas and the Indian territory. Immense herds of these cattle were formerly driven north into Kansas, where they were herded during the grazing season, and taken from thence to States farther eastward to be fattened in winter, or sold directly to the butcher. At a period still later the plains of Nebraska, Colorado, Montana, and Wyoming have been used as herding grounds for cattle descended from the Spanish or Texan stock, but improved upon by crossing with the Short-Horn and Hereford breeds, such crossing having wonderfully changed the original characteristics of these breeds. In California these Spanish cattle, which were formerly extensively herded there, have given place to improved breeds. Considerable attention is also paid to the transportation and acclimating of well-bred northern cattle into Texas for improving the herds there.

To illustrate what one man has accomplished in cattle herding, we give a brief mention of one of the pioneers in this business in Colorado, Mr. I. W. Iliff, commonly known as the "Cattle-king of the Plains," who owned at the time of his death the largest range in the United States. This gentleman was born in Zanesville, Ohio, and entered the business about seventeen years previous to his death, on a small capital, and, by constant accessions of land, finally owned a tract a hundred and fifty miles long, and a herd of cattle numbering 46,000. This ranch was located in Northern Colorado, extending from Julesburgh, on the Union Pacific Railroad, to Greeley, a hundred and fifty-six miles west, its southern boundary being the South Platte River; its northern a rocky bluff south of Lodge Pole Creek, making it nearly in the form of a right-angle triangle.

The range was divided into thirteen ranches. At each ranch were quarters for a portion of the forty-six men who take care of the entire range, and corrals where the stock was gathered to be branded, and where the horses were kept in winter. The Union Pacific road took out \$18,000 worth of supplies every year, and brought away from 12,000 to 14,000 head of cattle every season, valued at \$26 per head. At the time of the death of Mr. Iliff he had 46,000 head of cattle on the range. The average number of calves was 4,500 a year. The herds require but little care, but graze their own food the year round. When the weather was inclement they sought shelter in Chalk Bluffs, or some of the woody retreats. Generally the grass is sufficient the year round, and it is the best for food when dried. Water is plentifully supplied by Platte River, the Crow, and Little Crow. In severe winters like the last, many cattle die, but the average loss is less than 7½ per cent.

Mr. Iliff took pains to improve the breed of his stock, and his brand, which consisted of a monogram of his initials, was well known in Europe, whence a great deal of his stock, consisting of Herefords, Utahs, and Short-Horns, was shipped. During the seven years of his ownership of this range, Mr. Iliff shipped over 200,000 head of cattle to the East. Some of these were sent to New York and Philadelphia as an experiment, but the market finally settled in Chicago, 700 miles distant. Mr. Iliff considered it a poor success if in any year he did not ship 12,000 or 14,000 head of cattle from his ranch.

**Essentials in Cattle Herding.**—As generally managed, little or no provision is made for feeding in winter during extended drouths in some sections or severe storms in others; hence, great loss has been sustained by vast numbers dying from lack of food and exposure, deep snows and severe weather occasionally being encountered in the more northern of the grazing regions. Immense losses were sustained during the winter of 1881 and 1883 from the latter cause, which might have been obviated by a little forethought in providing hay for feeding, and also shelter during such storms. There should also be free access to water for the herd, and a plenty of range accessible to it.

In many portions running streams are rare, and the country is subject to extreme drouth;

where such conditions exist, recourse must be had to supplying water by Artesian wells, or by wells from which a supply of water can be forced by some mechanical means, into pools and tanks, such as the wind-mill for instance. Tanks or pools may be made in the ground for this purpose by thorough puddling, and grouting the bottom so as to prevent leakage. Such a pond must be sufficiently deep to counteract loss by evaporation. Cattle do not wander far from the feeding grounds. In this respect they differ greatly from buffalos and wild horses, and will die from want of water if it is not supplied, as they will not wander far in search of it. A cattle range cannot therefore extend farther than about five miles from permanent streams, unless water be supplied by wells.

There should be means provided for the sheltering of stock during storms. Where there are glouches, these may serve as a kind of protection, but where there are none, the best-protected locality should be selected and planted with timber, that is adapted to the soil. The Norway spruce and yellow pine will thrive in a dry soil, while the cotton wood, catalpa, and other varieties will grow well where there is sufficient moisture for grass to grow. Such a bed of trees must however be protected from the trampling of the cattle until grown to a sufficient size not to be injured in this manner. The above varieties of trees are quite hardy and will grow rapidly in soil to which they are adapted. The Indians were formerly quite troublesome to cattle herders, by their depredations, but within a few years, since being confined mainly to their reservations, this trouble has for the most part ceased.

**Habits of Prairie Cattle.**—General Brisbin, in his little volume entitled "The Beef Bonanza," has given the following concerning the habits of prairie cattle, when herded in large numbers: "I visited the herds of the Plattes and made careful inquiry as to the number of cattle, names of owners, and profits to be derived from cattle-breeding.

On the Laramie plains I saw the finest cattle, and one herd in particular pleased me, a drove of 1,500 cows, with 2,300 calves of various ages. First we came upon a few stragglers, or warders, guarding the herd, who seemed to be sentinels over the calves. Next we found families of two, four, and six, in groups, then bunches of a dozen, and lastly the great body of the herd. The cows were Texas, bred to large Durlham bulls, and the calves bore strongly the impress of the male. Nearly all had thick necks, sturdy bodies, and seemed very healthy. I saw one enormous bull, and near him a cow with three calves, one a two-year-old, one a yearling, and one about two weeks old. It was a grand sight, this herd of 1,500 cows, 50 bulls, and 2,300 calves. They were much scattered, covering the prairie for miles, and seemed an endless mass of beef for one man to possess; yet I was told that the gentleman who owned this herd had three larger ones. I saw a little calf just taking his first steps on the prairie, and stopped to observe him. The cow ran away at my approach, but immediately came back and stood resolutely and defiantly by her young; indeed, so wicked did she look, that the driver whipped up his horses and got away as soon as possible. These Texas cows are dangerous if approached too closely, and, from the fire in the beast's eyes, I am sure she was going to charge.

It is a study to observe the habits of the prairie cattle. They run in families like buffalo, the cows keeping their calves with them sometimes until they are three or four years old. It frequently happens that the mother has under her protection sons and daughters larger than herself. The cow watches over her offspring, and when they disobey punishes them with her horns, to which they tamely submit, like well-trained children. In the middle of the day the cattle leave the high grounds and go to the river bottoms for water, and about nightfall return to the high grounds. In traveling back and forth to the water they march in single file, using the same paths as the buffalo, and, like them, wear deep ruts in the earth. The cattle frequently go four and five miles to water, but, having slaked their thirst, nearly always return to the same ground from which they started out."

**Description of a Cattle Ranch.**—The following interesting description of cattle herding is from the pen of a practical herder in Kansas:

"It is the early dawn of a May day in western Kansas. A sea of rolling billows of land extends in every direction to the utmost reach of the vision. The plains are covered with a rich growth of blue joint and buffalo grass. A herd of cattle is sleeping in the corral by the creek—cows, two-year-olds, yearlings, and calves. A few ponies are picketed with long ropes on the prairie. A couple of saddles, blankets, and bridles hang on pegs by the corral bars. The scene is eminently peaceful. Occasionally a cow rises, and walking to the salt barrel gently licks the salt, then licks her nose, as though she had serious thoughts of pickling it, so as to insure its keeping over summer. But on reflection she concludes it will keep this season at any rate, and walks over to the stretching posts and there stands rubbing her neck up and down.

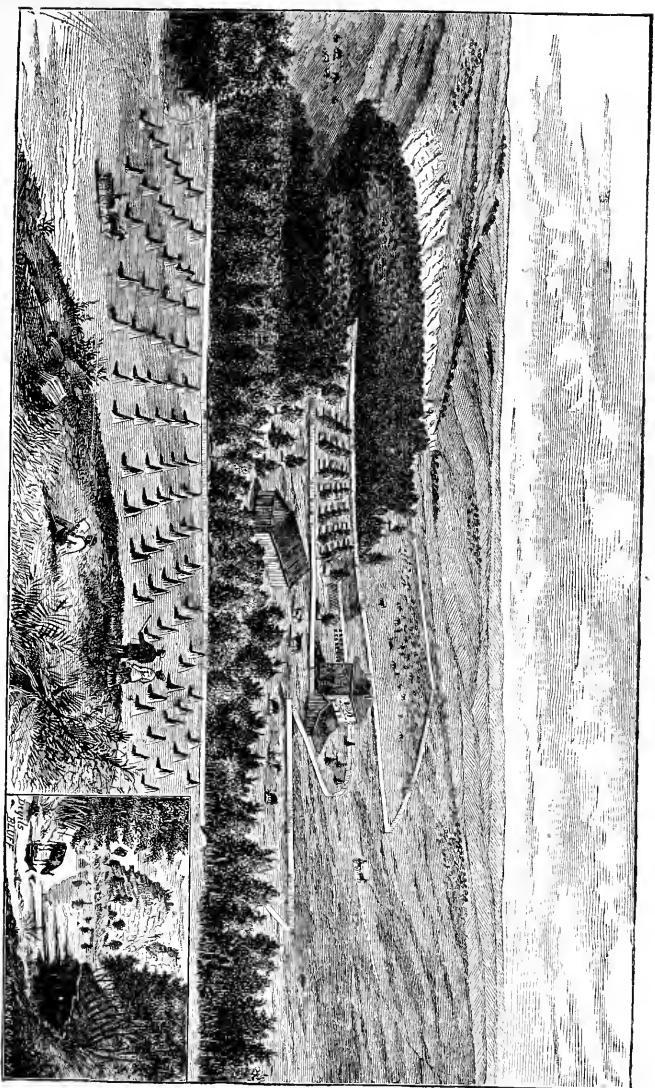
Suddenly stopping she gazes, open-eyed, at a wolf, who sits on her haunches some hundred yards from the corral, sitting there pensively, looking at the great amount of fresh meat. After gazing at the wolf until satisfied, the cow lies down again. The deep breathing of the cattle, the morning calls of the meadow larks, the soft music of the wind as it whistles through the short, tender grass, are the only sounds heard. As the east grows red, the occupants of a large dug-out, situated by the bank of a creek, lounge slowly out, and walk to the water, where they drink and wash—the latter is a speedy operation, as the herder does not waste time in washing. One goes to feed the ponies corn and saddle them, the other builds a fire and cooks the breakfast. This meal consists of corn-dodgers, or baking-powder biscuit, fried bacon, and strong coffee without milk or sugar. There may be 200 cows in the herd, but none are milked.

The herders simply exist with as little trouble as possible. As a rule, they do not read, do not think of anything but the cattle. To attend these well is their ambition. After breakfast the bars are taken down, and the cattle string slowly out of the corral. Forming in long lines, they follow the deep, well-worn trails that lead to the feeding grounds. It is a very leisurely march. Now and then an animal drops out of the file, eats a few mouthfuls of grass, but soon drops into file again and resumes marching. On reaching the desired feeding ground, the cattle spread and begin feeding. At about ten o'clock they are full, or nearly so; and, in a listless manner, they change front and feed toward the water. Arriving there, the herd drink, stand in the water, and so 'loaf' away an hour. They then lie down, and for two or three hours remain quiet. As the sun gets low, the cattle again spread and feed. As the sun sinks to the horizon, the herders slowly force them to feed toward their corral, and by the time they have fed up to it it is generally dusk. Bars are put up, ponies staked out, supper cooked and eaten, and the herders go to bed.

In all herds there are a few animals that lead off; that is, they will not remain on your range, but constantly endeavor to lead the herd to pastures new. These animals are generally yellow or black steers; but sometimes cows and heifers are guilty of the trick. Of course, these animals are sold as soon as possible; but, until sold, they are the cause of a vast amount of hard riding.

The cattle of Texas are not afraid of a man, nor are they afraid of a horse; but they are afraid of a man on a horse. They do not understand, at least do not seem to understand, that a man on horseback is a combination of animals. Apparently they regard the two as one animal, and one that is too powerful for them. To get off a horse in a herd of wild Texas cattle is almost worth a man's life, and an experienced herder will never do it.

All herds of cattle have a bully among them. There is a boss cow, and she is hated and reared. Of ugly disposition, constantly hooking unoffending cows, greedy in eating, she makes herself generally disagreeable. Or it may be that the bully is a steer; the characteristics of the brute are all the same. The rest of the herd are all afraid of her or



# CATTLE RANCH.

Owned by Messrs. Makin Bros., near Florence, Kansas.



him. Singly they can do nothing. Matters go from bad to worse, and cow life becomes almost unendurable in the herd. Something has to be done, and that soon. The bully in walking along gives some unoffending cow a sharp thrust in the ribs. Instead of running off, as expected, the stricken cow wheels around, fury in her eyes, and, bellowing a war cry, dashes head on for the bully. The boss is surprised, but gets to work as an expert, and the rebellious cow is being rapidly whipped (these cattle fence with their horns); but the cry for liberty is understood by the rest of the herd, and with an unanimous movement they all turn on the tyrant, and if the herders do not interfere, they kill him.

The bully, being whipped, turns to run, and to his horror finds that the whole herd is after him. As one animal gets near him, he receives a vicious dig from a sharp horn. He increases his speed, but soon another animal comes up to him, and another stab is the result. The bully, with extended tongue and labored breathing, is leading the herd, and the herd, with extended tongues and upright tails, are following—steers, cows, calves, all bellowing loudly, 'Kill him! kill him!' And kill him they will, if the herders do not stop the pursuit.

After a lesson of this kind the bully is a marvel of gentleness and consideration. A calf could whip him. Once I left my herd for an hour. On my return I was surprised to find the cattle bunched around a deep pool in the ravine. They were evidently greatly excited; the constant bellowing, the lashing of their tails, their craned necks as they looked over the banks of the pond, all indicated that something was wrong. Running my horse and swinging a heavy whip, I was soon among the cattle. They gave way for me. I rode up to the pool. There, standing in deep water, was the bully, a ring of excited steers and cows standing around him, but unable to reach him. I put a stop to the fun, and left the bully in the water to cool off. I did not see him for a week. Then he joined the herd a private.

If an animal in the herd gets badly wounded, it will be killed by the others if great care is not exercised. The sound animals turn ruthlessly on the sick or wounded ones.

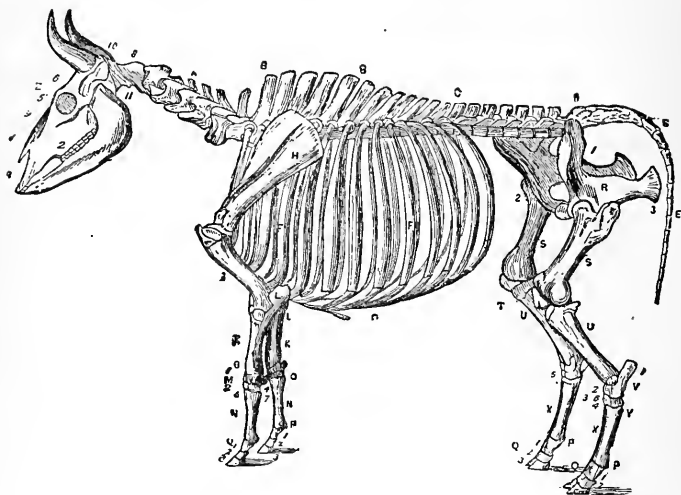
It looks hard, and the unthinking observer remarks on the cruelty shown toward one another by dumb animals. It is simply an expression of the instinct of the animals, by which they expect to ward off attacks of wolves, and to prevent their prowling about the herd by removing the inducement to it. The animal is wounded, badly wounded; the wolves smell him, and, from far and near, gather about him. The cattle, in their wild state, constantly moved up and down the water courses; so when they killed the sick animal, they left the body behind. Now they kill the sick one for the same reason, and daily feed about his carcass.

In July the herd is fat; calves are doing well and are full of play; grass is plenty, and the herd, as a whole, feel splendidly. They are easily amused, too. Jack rabbits are plenty in Kansas, and are a never-failing source of amusement to the cattle. Accustomed to the rabbits from their calfhood up, it is simply absurd to see the actions of the animals. A calf finds a big jack rabbit, and, very naturally, is interested in looking at this wild beast. Cautiously approaching him, she gazes open-eyed at the small monster. Another calf joins her, and they each regard the animal. Beginning to caper about it, the attention of the herd is attracted, and they all come up to have a look at the jack. He is made to get up and jump quaintly off. The cattle all follow; the rabbit sits down, again to be forced up; and when he again jumps off they caper around him, or, with pretended alarm, they bellow and run away.

Many men who came to Kansas in 1869 went into the cattle business, bringing Eastern ideas with them. They very naturally built sheds to protect their cattle from the cold storms of the winter. I did this, and made a mistake. The reason why sheds are not good is, that the cattle stand under them when the cold winds blow, and refuse to leave the shelter to feed or drink; and when weakened by this lack of food they lose vitality, and huddle

together for warmth. This huddling is very dangerous; the outside cattle want to be on the inside, and they pile up on each other. This piling is called 'stacking,' and when once begun, some cattle are sure to lose their lives. Out of one 'stack' I took twelve dead steers one morning. A neighbor of mine took thirty-six dead beeves out of one 'stack.' After losing the twelve steers I took down my sheds, and that ended the trouble."

**Skeleton of the Ox.**—The following shows the scientific names of the bones in the skeleton of the ox, together with their location.



SKELETON OF THE OX.

A—Cervical Vertebrae. B B—Dorsal Vertebrae. C—Lumbar Vertebrae. D—Sacrum. E E—Coccygeal Bones. F F—Ribs. G—Costal Cartilages. H—Scapula. I—Humerus. K K—Radius. L—Ulna. M—Carpus or Knee. 1—Scaphoid. 2—Semilunar. 3—Cuneiform. 4—Trapezium. 5—Trapezoid. 6—Os Magnum. 7—Unciform. 8—Pisiform. N N—Large Metacarpal or Cannon. O—Small Metacarpal. P P—Sesamoid Bones. Q Q—Phalanges. 1—Os Suffraginis or Pastern Bone. 2—Os Coronae. 3—Os Pedis. R—Pelvis. 1—Illium. 2—Pubis. 3—Iscium. S—Femur. T—Patella. U—Tibia. V—Fibula. W—Hocks. 1—Os Calsis. 2—Ostragalus. 3—Ostragalus. 4—Cuneiform Medium. 5—Cuneiform Parvum. 6—Cuboid. X—Large Metatarsal. 1, 2, 3—Phalanges. Y—Small Metatarsal. Z—Head. 1—Inferior Maxilla. 2—Superior Maxilla. 3—Anterior Maxilla. 4—Nasal Bone. 5—Molar. 6—Frontal. 7—Parietal. 8—Occipital. 9—Lachrymal. 10—Squamous. 11—Petrons.

**The Pulse, Respiration, etc.**—The pulse in cattle generally ranges from forty-eight to fifty-five beats per minute in the mature ox. In cows it is generally somewhat quicker, especially near the time of calving. In calves, as with all young animals, the pulse is considerably faster than this, according to the age. The condition of the pulse may be readily ascertained from the artery passing over the jaw bone directly at the cheek part of the lower jaw, to ramify on the face; also over the middle of the first rib, and that beneath the tail. A quickened pulse denotes a feverish state or inflammation, while a slower pulse than is natural indicates debility of some kind. The pulse of cattle, when in a perfectly healthy state, is softer and less strong than it is in the horse under similar conditions.

In cattle the number of respirations per minute is from ten to fifteen; these respira-

tions are always accompanied by a soft rustling sound caused by the air rushing through the air cells of the lungs, which may be distinctly heard by placing the ear to the chest of the animal. A change caused by any inflammation or disease of the lungs or air passages can readily be detected by the sound of respiration.

The temperature of the body can be determined with considerable accuracy by feeling the horns at their roots, the skin, ears, and legs. When the exact temperature is desired, a clinical thermometer is used, which is a thermometer so formed that its bulb can be inserted in the rectum of the animal, where, after remaining three or four minutes, the exact temperature will be indicated. The use of this instrument has established several important facts relative to diseases in connection with the temperature, viz., that different diseases have different ranges of temperature beyond which recovery is impossible; for instance, it has been ascertained that a horse may recover in case of pneumonia, at or even beyond a temperature of  $109^{\circ}$ ; but with cerebro-spinal meningitis, the disease has always been found to prove fatal soon after reaching a temperature of  $104^{\circ}$ .

**General Indications of Disease in Cattle.**—The coat of an animal is a good indication of the state of health. What is termed a "staring coat," or a coat in which the hairs stand out straight from the skin, is a symptom of a low condition of health. Isolation from the rest of the herd, the ceasing to chew the cud, shivering at slight exposure to cold, or to none at all, generally indicate an attack of some disease. The peculiar position when standing, the manner of lying down, getting up, or of moving about are also significant. The muzzle of the healthy ox or cow is moist, or covered with beaded drops. In disease, and more especially in fever, it becomes either hot and dry or unnaturally cold, and sometimes changes to a pale shade in color, but more frequently it becomes overcharged with blood. In cows a low condition or attack of disease is also usually accompanied with a drying up of the milk.

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## DISEASES OF CATTLE.

**W**HEN properly managed, cattle are not subject to many diseases. A few things are essential to the perfect health of any animal, and these may be comprised in a sufficient supply of pure air, pure water, nutritious food, and shelter from the inclemency of the weather. If, when stabled, proper attention be paid to ventilation, cleanliness, and warmth, with a liberal supply of pure water, proper food, and a frequent but gradual change of diet, there will be but few, if any, derangements of the system which nature will not remedy far better than nostrums or drugs of any kind. Cattle that are neglected and kept in a half-starved condition, or those that are managed according to an extremely opposite method, being pampered and forced with a surplus of highly stimulating food, are much more liable to disease than those that are well fed and judiciously managed.

Common sense is fully as requisite in the treatment of stock as in the management of any other department of the farmer's avocation, and if good judgment be exercised in the use of *preventive* measures, there will be but rare necessity of resorting to the curative properties of remedies, since the large majority of diseases are caused by improper management, or want of care. Prevention of disease is in all cases much more easy, and attended with less trouble and expense than the curing process; in fact there are some diseases that can only be successfully treated by an educated veterinarian. The farmer who doses and drugs his cattle for every slight or imaginary ailment commits a great error, and will be liable to bring on more difficulties than he relieves. In all cases the symptoms should be

carefully studied, and the real nature of the disease ascertained before resorting to any remedy. The common diseases of cattle that are most to be dreaded are perhaps garget, puerperal or milk fever, and idiopathic or common fever.

Fortunately for the present age and the races of cattle generally, the number of ignorant quacks who resort to bleeding, boring into the horns, cutting off or splitting of the tail, and other equally barbarous practices, is much smaller than formerly, and is gradually being reduced, while those who resort to a common sense and humane method of treatment, are taking their places.

The "heroic treatment," however, still prevails quite too extensively with herdsmen, as well as those having the care of other domestic animals, and is quite as likely to kill as it is to cure.

Prescriptions for such supposed and ridiculous maladies as "tail ail," "hollow tail," "horn ail," and "wolf in the tail," will not be found in this work; for the treatment of imaginary evils with torturing remedies is not only needless, but as absurd as it is cruel, and is the result of ignorance and superstition. The remedies that have been recommended for these supposed diseases are often as ridiculous as they are strong and pungent in their nature; for instance, the former popular remedy for the above supposed diseases of the tail, as is well known, was first to split the end of the tail five or six inches, and supplement this by putting on a quantity of red pepper and salt, after which the tail was wrapped in a cloth and tied up. In the same connection with the former, a pint of spirits of turpentine was frequently rubbed into the skin on the back of the animal from head to tail. If the poor beast lived through these tortures, the sage doctor considered it a remarkable cure, and an additional proof of his wisdom and skill! If the tail is soft and full at the end, it is owing to an effusion, the result of a disordered condition of the animal system, instead of a disease of the tail.

With regard to "hollow horn," we would say that the horns of all cattle after three years of age, are hollow at or near where they are attached to the head; the hollow increasing with the age of the animal; the only exception being with bulls or those cattle with very short stubby horns. The coldness or heat of the horns, as the case may be, is only an indication of the condition of the general system, and not of a disease of the horns.

Many valuable animals are lost through the treatment of ignorant quacks or those who follow their teachings, in the treatment of real or imaginary diseases. Some judgment, or what might be termed practical common sense, is particularly essential in the management of stock, and when this is exercised, but few remedies will be required to maintain a general sanitary condition among cattle, or any of the other farm animals. In most diseases there is a natural tendency to recovery, and in the majority of cases the animal will recover if allowed a fair chance. There is no doubt that many animals are doctored to death, when if left to nature, they would have gone safely through. Good care and tender nursing are better than medicine, and to all having charge of animals we would say, nurse well, give good care, but dose sparingly; rather let an animal take his chances of recovery or dying a natural death, than of killing him with powerful nostrums.

We give in this connection some of the more common diseases of cattle and accidents to which they are incident, with remedies for the same, which department has been carefully prepared by consulting the best European and American authorities on the subject, as well as from personal experience and observation.

The cause of diseases and their prevention will be found to have received considerable attention, these being regarded as of primary importance, since it is much better in all respects to prevent the evil in the first place, than to eradicate it when once developed.

**Abortion.**—Abortion, or the slinking of calves by cows, is a source of serious loss to many farmers and dairymen, and is liable to occur at almost every month of gestation, but

more particularly from the sixth to the ninth month. The application of the term abortion is generally restricted to those cases of miscarriage which take place at such an early period of gestation that the foetus could not survive, while cases that occur later, when the offspring is so completely formed as to be able to maintain an independent existence, are generally denominated *premature birth*.

The average period of pregnancy in the cow is about 284 days, and any cause that will have a tendency to sever the foetal connection much before this time may be regarded as an injury, since it disturbs and arrests in a measure the development and tranquility of the young animal in the last stages of its uterine life, and everything that may have a tendency to bring about this condition of severing the relationship existing between the dam and offspring should be avoided. In the breeding of choice stock the loss of the calf is no small item, while in some cases the cow either dies, or is rendered practically useless, remaining for a long time in a feeble and sickly condition, and can neither be fattened nor made useful in supplying milk. In rare instances we have known cows that have aborted to continue in milk, but the milk was poor in quality and small in quantity. Cows are more liable to abort than any other animal. As a rule, a cow that has once lost her calf will never afterwards be a safe breeder, but will be liable to the same trouble again, while her presence in the herd is a source of danger to others.

It not unfrequently happens that unless precautionary measures are taken, abortion will spread through an entire herd, although it cannot be properly regarded as contagious. Cases are on record where fully twenty-five per cent. of a herd of cows have aborted in a single year, and from no clearly ascertained cause. Whenever there is the least indication of this evil making its appearance in a herd, the greatest caution should be used to prevent its increase. The cow that is affected should be immediately excluded from all the others. The sight or smell of the foetus or after-birth might produce such an excitement as to cause other cows to abort, consequently great care should be exercised in this respect, and both be deeply buried. The stable in which the affected cow has been confined should also be thoroughly disinfected before being occupied by another animal. There may be, however, some local cause for the evil to which the entire herd are exposed, and this must be removed before the difficulty will cease.

**Principal Causes of Abortion.**—Anything that will have a tendency to excite or disturb the intimate relationship existing between the mother and offspring, such as fright, injuries received, or violent exertion, will be liable to cause abortion. Pregnant cows should, therefore, be treated gently and kept as quiet and contented as possible. They should never be treated harshly in any respect. Never permit a brutal man or boy to abuse them with whip or voice. Great injury is often done by the employment of careless boys to drive the cows, and the free use of the whip. Cows that are soon to come in should never be driven out of a walk, over rough roads, worried by dogs, forced to climb steep hills, or jump over bars, as is too frequently the case, when indifferent and incompetent help is employed on the farm. It sometimes happens that the slant of the stable floor may be such as to produce a constant strain on the body, and cause abortion. Lack of cleanliness, and insufficient bedding will frequently be found to be the cause of the difficulty. Cows that are compelled to lie upon a cold, damp, stable floor night after night, with no bedding for protection, cannot be comfortable. Everything that has a tendency toward unsanitary conditions, or discomfort, will be liable to do harm to a breeding animal.

Want of sufficient food will not unfrequently cause abortion. Although the foetus derives its nourishment from the mother, and grows at her expense, an ill-fed cow may possibly produce a calf that has not suffered sufficient privation in its natural nutriment to cause any serious injury to the latter, yet a pregnant cow, kept in a half-starved, weakened, and emaciated condition, would be very susceptible to unfavorable influences and be more

liable to abort from slight causes than a well-fed, vigorous animal that received proper care in every respect. Abortion may also be the result of injudicious feeding in many respects. An able authority on this subject says:

"A coming-in cow that has overeaten of dry meal, and has *impaction of the manifolds*, is quite liable to abort, if she survives. A severe case of hoven, also, during the last months of pregnancy, is almost sure to be followed by a miscarriage, on account of the pressure and mechanical disturbance that the womb receives. In fact, the sympathetic connections between this important generative organ and the intestinal track are so intimately blended, that very laxative and irritating food is often followed by serious consequences in the pregnant female. Rye bran and potatoes, when fed in large quantities to a cow, at almost any stage of gestation, often give rise to such a copious diarrhœa, especially if she has plenty of cold water to drink, that the uterine cavity becomes involved, and thus its living contents expelled.

The condition of forage should never escape the dairyman's or breeder's attention. Much harm has been done in feeding musty hay and fermented meal, as well as the ergotized grains, to pregnant animals. The first is a very deleterious article, and never should be fed to any kind of stock, on account of its great tendency to constipate the bowels, and thus bring on a type of disease not easily controlled. The various kinds of feeding mixtures that have been 'heat,' and are undergoing putrefactive changes, are not only quite worthless, many times, in a nutritive point of view, but absolutely dangerous to be used. A full meal of such a damaged article of food is liable to overcome the action of the gastric juice, and consequently bring on a case of hoven, or *tympo-enteritis*, which invariably compromises the safety of the unborn progeny.

The effect of ergot, or *spurred rye*, upon the muscular fibres of the womb is so powerful, in causing contraction of that organ, that physicians have used this peculiar *fungus* for more than half a century as an article of medicine in obstetric practice. Several species of fungoid parasites, closely allied to this medicinal one, which is botanically known as the *Secale cornutum*, are found growing upon the other cereals and the various grasses. These fungi grow much more extensively and luxuriantly upon the moist fields and during the wet seasons. The quantity of this *poisonous* substance, therefore, that cattle are liable occasionally to consume, either while at pasture, or in the barn during the winter, will be found to be quite variable in different localities."

Abortion is not unfrequently occasioned by pampering the animal with highly stimulating food in hot stables; slipping in the stall or on the frozen ground, annoyance from the bull or others of the herd, purging, the drinking of impure water from stagnant ponds, etc.; in fact, the more quiet you can keep breeding cows, and the nearest approach to perfection in the sanitary conditions and general management that can be attained, the less danger will there be of trouble in this respect, and the better it will be for the offspring.

**Symptoms of Abortion.**—The first symptoms of abortion are generally a loss of appetite; the animal will cease to chew her cud, seem listless and dull, separates herself from the rest of the herd, and is inclined to lie down, with a disinclination to get up; the milk diminishes in quantity, and sometimes dries up. After a time she will grow restless, and there will be a watery discharge from the vagina, followed a little later by discharge of the foetus. If the abortion occurs later in the period of gestation, the animal will sometimes show great distress until the foetus is discharged, and it is often in such cases in a partially decomposed condition, showing that it has been dead for several days. This will be sometimes followed by the discharge of the after-birth, but it usually becomes decomposed and drops away in fragments, being very offensive in odor. When abortion occurs early in the period of gestation, the symptoms will frequently be very slight. More or less discharge of a bloody mucus character will follow for several days after the loss of the foetus.

**Treatment.**—As soon as the symptoms of abortion are discovered, the animal should be separated from the rest of the herd, and put in a comfortable cow-house or shed. If the discharge is not offensive, it may be that the foetus is not dead, and the abortion may be avoided by proper care. Motions of the foetus are a sure indication of its not being dead. The cow should be kept as quiet as possible, and be allowed gruel only, except perhaps a few oats for a few days. By such precaution the irritating cause of abortion, or the conditions preceding it may be removed, and the evil avoided altogether. If the discharge be fetid, it is a sure indication that the foetus is dead, and the sooner it is gotten rid of the better.

If the water sack enclosing the foetus has not been previously broken, this should be done with the greatest care, in order not to puncture the womb, which would cause death to the animal. In other respects the treatment should be the same as though her usual period of gestation had passed.

The after-birth should be removed in the most careful manner, taking plenty of time. Haste or harshness might result in the death of the cow. Then syringe the parts out thoroughly with warm water, and follow it with an injection of carbolic lotion as follows: one ounce of carbolic acid to a gallon of water. Inject into the womb a half-pint of this lotion two or three times a day for a week or ten days. Should there be much hemorrhage, which may result from protracted labor, injuries to the parts from carelessness or lack of skill in removing the placenta, the injection of cold water into the womb, or water in which a little pulverized alum has been dissolved will generally remedy the difficulty. Too much importance can not be placed upon the necessity of removing all traces of the foetus and placenta, by burying them at a distance from the places frequented by the herd, and thoroughly cleansing the stable before it is occupied by other animals. A cow that has once established the habit of aborting will always be an unreliable breeder, and will generally prove most profitable to be fattened as soon as possible.

**Albuminuria.**—This is a disease of the kidneys, similar or identical with Bright's disease in the human species. It is supposed to be, to a certain extent, caused by an impoverished condition of the blood, and is most common where there is a too long continued sameness of food, or where other methods of injudicious feeding and bad management are practiced. This disease is sometimes cured in its early stages, but is very difficult to remedy when far advanced.

The most common symptom of this disease is the stretching of the body at full length, and getting the hind and fore feet as far apart as possible. It is usually accompanied by constipation, an unnatural gait, with the hind feet wide apart, stiffness, and a reluctance to move; the urine will be of a mucilaginous character, and dark in color. The liver, kidneys, and intestines are generally diseased in established cases, and in some instances the brain also sympathizes. Discontinue all green food except grass or ensilage, and give a good supply of grain. Milk and eggs are also excellent. The constipation should also be relieved by injections of lukewarm water.

Give also in one dose the following: Epsom Salts, twelve ounces; ginger, one ounce; gentian, one ounce; syrup, four ounces; water sufficient to make two quarts.

If the difficulty is not relieved, give the following recipe: two drachms sulphuric acid; one and one-fourth ounces tincture of cardamoms, mixed thoroughly in a pint of water.

**Anthrax.**—This disease is known by various names, according to the nature of the attack and its locality, such as Black Leg, Bloody Murrain, Black Quarter, Black Tongue, Quarter Evil, Carbuncular Fever, Charbon Bovina, etc. It is a common disease, and one to be feared by every stock-breeder, being virulent, malignant, and contagious. It appears under very different forms externally and internally, and attacks different species of the lower animals, as well as man, the manner of attack depending upon the influence that produced it, whether by inoculation or otherwise.

It is most destructive to the young cattle of America and the continent, and is characterized by an alteration and malcondition of the organic elements of the blood. In whatever part of the body the disease locates, that part turns black in color, and the blood of the animal becomes thick and black, hence the term "black leg," and "quarter evil." Diseases of this class are often so virulent and are propagated so extensively by contagion, that no state or condition of the animal system will be a protection against its deadly effects by contact. The causes of this disease may be traceable to the influence of temperature, evaporation from morasses, stagnant swamps, ditches, etc.; also food or water that has been tainted with decomposing animal and vegetable substances and contagion. One of our leading veterinary surgeons says relative to this disease:

"Rapid alternations of heat and cold, accompanied by excessive dryness or persistent fogs, torrid temperature, followed by storms, produce such wide contrasts in the air in which the animals under consideration live, and which they breathe, that it is not surprising to find their constitutions impaired when they are exposed to such violent changes, especially when we consider the fact that the health of the blood, so to speak, depends upon its exposure in a natural and temperate way to atmospheric influence. Each inspiration brings into contact with the blood the atmosphere surrounding the animal, and if at one moment it is hot, and at another cold and dense with moisture, it must certainly have a deleterious influence.

This cause alone breeds many diseases, and doubtless favors charbon. The disease is common in districts where large territories are covered with stagnant water, and where during very dry seasons such moisture is taken up, and the decomposing vegetable matters are exposed. Again, lowlands subject to semi-yearly inundations, when the water lingers for a long time on the pastures, render the animals living thereon particularly liable to charbon. In portions of the continent where this condition exists to a considerable extent, the disease is enzootic. In Siberia, where marshes are numerous, it is stated that in 1784 nearly 100,000 animals perished. (*Annals of Veterinary Medicine.*)

Thus the bitter experience of the past has taught the stock-owners in certain districts where the action of the miasmatic gases and effluvia are so destructive, to move their animals to the hills during the heat of the day. In these low, marshy districts during hot weather, not only do gases emanate, but animalculæ are propagated to a certain extent; thus the food of cattle in such places furnishes the myriads of infusoria. The gases gain access with the air breathed. Soil also has its influence in the production of charbon. Clay and calcareous lands prevent the escape of water; hence stagnation, putrefaction, and effluvia. Other causes might be noted did time permit.

Black-leg is a disease of young cattle. It usually attacks those that are growing the fastest and doing best. Of a sudden the animal becomes listless, drops its ears, looks dull, a swelling is noticed along the back, neck, loins, or on a limb. If the latter, lameness is present. The creature now either lies or stands quietly and refuses to move; rumination and appetite are gone, bowels constipated, and urine high-colored. It must not be supposed that the disease localizes itself in a leg only, from its name, for it is a systematic disease and develops in any part, according to circumstances. The swellings, when rubbed by the hand, feel as though there is air under the skin; it crackles sometimes. These swellings are enormous, and at first are hot, after a time becoming deathly cold.

This disease does not have a long duration, and the animal usually sinks in a few hours, or, I might say, from a few minutes to thirty-six hours. The pulse runs high—from 80 to 110 beats per minute; eyes are dreamy in expression, ears pendant; the animal has no inclination to move; its movements stiff, is tender about the loins, lies down and objects to rising. The swellings are very characteristic of the disease, when once understood. The animal gets more depressed as time advances, and in a few hours is unable to rise. It may have convulsions, or die from exhaustion of the heart's action. The swellings noticed are blood

extravasations into the subcutaneous tissues. Decomposition soon takes place; gases are evolved, and these create the crepitus felt under the skin as the hand is passed over it. It is a disease rarely witnessed in animals over two years of age. It is essentially a blood disease, this fluid undergoing change rapidly, and having a tendency to decomposition. It is commonest in the best bred animals, which are doing the best, and is often seen in animals changed from poor to rich pastures.

Its origin is sometimes not traceable to any cause, and when the disease is recognized, it is of little use trying to abate it, as a rule, for by the time it is discovered, the blood is in such a condition that death ensues ere it can be restored to its normal vitality. Chlorate of potassium in from one to three-drachm doses, dissolved in water and given every two or three hours, is as good treatment as can be given. Whisky, spirits of nitrous ether, and quinine may also be of service. *Prevention is better than cure."*

It will be seen from the above description, and causes of this malignant disease, that young cattle and those in good condition are most exposed to it, that it is caused by blood poisoning, and, that the latter is induced in many instances by bad sanitary conditions, and by sudden changes of temperature, or of pasture. A quick removal should be made from the infected pasture to one with better health conditions of higher ground, purer air, and pure spring water; at the same time separating the healthy from the sick animals. All carcasses of animals that have died of this disease should be immediately and deeply buried, and with them a generous amount of quicklime, that decomposition and disinfection may be effected as soon as possible—the flesh being alike poisonous to man and the lower animals. Rely mainly on nature for a cure, and improved sanitary conditions for a remedy, as well as a preventive of this direful disease.

In order to guard against it therefore, all the conditions and circumstances must be taken into account. Young animals must be kept in good condition and steady growth. Bleeding, although it should be resorted to but rarely, is sometimes attended with benefit in well kept animals. On the other hand, animals in a poor condition should be fed with more nutritious, laxative food, keeping the bowels, kidneys, and skin as active as possible without overtasking them. Linseed cake is excellent for stock in this condition, also bran, with salt frequently given, potatoes, etc., to keep the bowels open.

Guard against exposure to cold, especially nights. For unwholesome localities where the soil is overcharged with moisture, drainage is the great and sure remedy, as it removes the great cause of the evil. If drainage is not practicable, the stock should be removed from the ground as soon as it dries up in summer. When hay is fed from such meadows, it should be first watered with carbolic acid in the proportion of one part carbolic acid to 100 parts water. This is an antiseptic, is cheap, and perfectly safe to use.

The rapid fatality of this disease renders treatment in many cases of little avail; the chlorate of potassium, as previously recommended, is one of the very best known remedies.

Another method of practice that is sometimes beneficial, if the patient is not weak, is to give a dose of Epsom Salts,—from three-quarters of a pound to a pound to a full grown ox, —two ounces to calves,—dissolved in warm water, with one ounce of extract of ginger; this to be followed by two doses per day of one drachm nitro-muriatic acid; two grains bichromate of potash; two drachms chlorate of potash, mixed in a half-pint of water.

Bathe the tumors with a solution of carbolic acid, one part carbolic acid to twenty-five or thirty of water, and apply poultices to keep up suppuration for a time. Weak animals should have stimulants administered three times a day, instead of salts, such as whisky, ale, or ether, in from one to two ounce doses.

To the cattle of the herd that have been exposed to this disease by one or more sick animals, should be daily given in the food or water, as a preventive, about a drachm each of carbolic acid and chlorate of potassa per head. This may be continued for ten days or two

weeks, and should any new cases appear, the dose may be doubled, and a drachm of iodide of potassium added to it. The stables, yards, etc., where the sick animals have been confined should be thoroughly cleansed and sprinkled with freshly-burned quick-lime, and the wood-work, walls, utensils, etc., washed with a solution of chloride of lime, in the proportion of four ounces to a gallon of water.

Every caution should be used, as this disease is communicable to man; therefore never handle the carcass of an animal that died of this disease, or permit any of the products of a sick animal to touch the hands, as a slight scratch or sore on the hands might be the means of causing inoculation of this disease. The hands should always be washed with a weak solution of carbolic acid after any slight exposure.

**Barrenness.** (See STERILITY.)

**Black Leg.** (See ANTHRAX.)

**Black Water.** (See HAEMATURIA.)

**Bloody Milk.**—In very heavy milkers, it sometimes happens that blood will be more or less mixed with the milk, thus rendering it unfit for use. This may result from various causes, such as the harshness of the milker by hard pulling or pushing, or from the bunting of the calf. It also occurs as a consequence of inflammation of the udder, internal lesions of the teat, milk chamber, or quarter, etc. The treatment to be adopted should of course depend upon the cause of the evil, which should be removed if possible.

In large milkers the udder and milk veins are distended to their utmost capacity with milk, and any harshness in handling the teats or udder would have a natural tendency to create inflammation in that locality. In such cases, gentle treatment and more care in the milker will procure a successful remedy. Where the difficulty is caused by local irritation, either of the following remedies are very good:

Three drachms of camphor, three ounces of powdered oak bark; three ounces of powdered ginger. Mix and divide into six doses, giving a dose morning and evening in a pint of gruel. Another remedy; one ounce and a half of tannin, and four ounces of powdered gentian root; mix and divide into twelve parts, giving one part each morning and evening in gruel the same as the foregoing. Bathe the udder with luke-warm water, and apply extract of witch hazel. The udder should be stripped clean at each milking, and the cow kept in a warm, clean stable, free from cold drafts. Give warm mashes, and easily digested, sloppy food, for a time.

**Bloody Murrain.** (See ANTHRAX.)

**Bronchitis.**—This is an inflammation of the mucous membrane which lines the bronchial tubes, and may be caused by exposure to cold, or from the extension of inflammation that is always present in catarrh. The symptoms are rapid, painful breathing, each expiration being made with evident effort; a severe cough, accompanied a few hours after the attack with considerable fever and a rapid pulse.

The temperature of the body will frequently be from 100° to 105°, or even higher, as indicated by a thermometer inserted under the tongue, or in the rectum; the main portion of the body, the nose and horns, near the head, being unnaturally hot, while frequently the tips of the horns, ears, and legs will be cold. By placing the ear close to the sides and front of the chest, a harsh rattling sound can be heard in breathing. After three or four days, mucus and phlegm will be raised in coughing. The fever will generally subside in from six to eight days in mild cases, but if the inflammation extends to the lungs and pleura, which it is very apt to do, the disease then becomes pneumonia or pleurisy.

The animal should be put in a warm, comfortable stable that is well ventilated. Pure air, without exposure to draft, is very essential in this disease. Warm, soft food, such as

warm mash, should be given, and such medicines as are cooling and laxative, together with good nursing. Epsom salts in from eight to ten-ounce doses, and saltpetre in from four to eight-drachm doses are very good remedies. Apply also a mustard paste to the lower part of the throat and sides of the chest. This done in the early stages of the disease will have a beneficial effect in arresting it. The animal should be permitted to have all the water it will drink, and free access to it, instead of at stated times, as it will then drink frequently in small quantities, thus allaying the fever, while if permitted to have access to it only occasionally there will be a tendency to drink too much at a time, and remain thirsty during the intervals.

Another very good remedy is  $1\frac{1}{2}$  ounces of acetate of ammonia, 20 drops of tincture of aconite, well mixed in a half pint of water, and given as one dose three or four times a day until the fever abates. This should also be accompanied with the use of the mustard paste, as previously recommended.

**Bruises or Contusions.**—Bathe the bruised part in warm water for some time, accompanied with gentle rubbing, if the soreness is not too severe to admit of it. Afterward apply tincture of arnica. The sooner this treatment is resorted to after the injury, the better. Warm water in such cases is far more effectual than an application of cold water or ice, as is frequently recommended.

**Catarrh.**—In cases of simple catarrh or common cold, the mucous membrane lining the nostrils and sinuses of the head become inflamed, affecting to a greater or less extent the eyes and throat. There will be more or less fever in the early stages, with occasional turns of shivering, sneezing, and coughing. The horns will be hot near the head, and cold at the tips; there will be a watery discharge from the nose and eyes, the eyes and eyelids showing inflammation; the pulse rapid, and temperature of the body unnaturally high; urine scanty and high-colored, and bowels usually constipated. In advanced stages of the disease, when badly affected, the nostrils will sometimes become obstructed, and the animal be obliged to find relief by breathing through the mouth, bloody matter occasionally oozing from the nostrils. The cause of the difficulty is generally exposure to the cold or wet; damp or badly drained stables; standing in a draft of air in improperly ventilated stables, etc. Put the animal in a warm, dry, well-ventilated stable; then feed hot bran mash in a nose-bag, in order to steam the inflamed membranes. If the throat seems sore or swollen, apply mustard paste, and if this does not reduce the swelling after a few hours it will be well to put on a linseed poultice as warm as can be borne without discomfort. A tablespoon full of saltpetre dissolved in water, drank at night and morning, should also be given. The bowels should be kept open; a pint of melted lard may be given at first to relieve constipation, which, together with food of a loosening tendency, such as bran mash, potatoes, etc., will produce the desired result. Injections of tepid water may also be given, if necessary.

If the discharge from the nose is copious and of long standing, inject into the nose once or twice a day a moderate quantity of the following astringent solution: Sulphate of zinc  $\frac{1}{2}$  drachm; glycerine, 1 ounce; mix thoroughly in a quart of warm water.

Good care and nursing are more essential than medicine. The principal thing of importance to be done is to remove the cause of the evil, and avoid exposing animals to such conditions as will lead them to take cold.

**Chapped Teats.**—Bathe in warm water until the surface is soft and pliable; wipe the teats dry and apply melted fresh lard, or what is better, sweet cream that has been simmered to an oil. Two or three applications a day for three or four days will generally be successful in effecting a cure.

An ointment that is frequently used with benefit is made of one ounce of powdered alum; one drachm carbolic acid; four ounces fresh lard. Extract of witch hazel is also excellent for bathing the teats in such cases.

Chapped teats usually result from a want of cleanliness on the part of the milker. If the teats are left clean and dry after each milking, there will generally be no difficulty in this respect. Great patience and kindness should be exercised by the milker when cows' teats are sore, taking plenty of time to soften the teats well with the warm milk before attempting to press upon them.

**Choking.**—This often results from feeding apples and uncut vegetables, particularly such as are round, like the potato. The best remedy is found in prevention, by cutting such food before feeding. Sometimes cattle will break out of the pasture and gain access to unprepared food, and in this way become choked. There is necessity of removing the foreign substance from the throat as soon as possible, or the animal will be liable to die of suffocation. Such cases are frequently attended with much pain; froth issues from the mouth, the body commences to swell from the amount of gases in the stomach and intestines, the creature groans and seems to be in great distress. We have known cattle to obtain instant relief by being made to sneeze, the spasmodic effort throwing the obstacle from the throat. An obstruction, if not too large, can sometimes be safely forced out of the *œsophagus* into the stomach by inserting a flexible rod or tube (rubber being the best material), and pressing it for a second or two at a time carefully upon the foreign substance. The tube should first be well oiled, and it would aid very materially to turn a half-pint of olive or linseed oil down the throat of the animal before the operation, to lubricate the parts.

This operation should be attended with great care and patience, or the tender membrane will be injured. The nose should be elevated before inserting the tube, in order to make the line of passage down the throat as nearly straight as possible. If the gullet should be ruptured or torn by the carelessness of the operator, or roughness of the instrument used, the consequences will prove serious. A hollow rubber tube is best for this purpose, and if the obstruction is passed into the stomach, the tube should remain there a short time to permit the escape of the accumulated gases. When the animal has become badly swollen, the gas may be neutralized by giving ammonia, or either chloride of lime or chloride of soda after the object has been removed. If ammonia be used, two ounces of the liquid in a quart of water should be given every half hour until the animal is relieved.

Three drachms of either the chloride of lime or the chloride of soda, dissolved in a pint of water, will usually give almost instantaneous relief. Care should be taken, after the obstruction has been removed, not to allow any solid food to be eaten for several days.

**Colic or Gripes.**—This disease in cattle is sometimes caused by constipation, but more frequently by drinking too much cold water when overheated. The flatulent colic is occasioned by the animal gorging itself on fresh, succulent grass. It is found also that cattle that are kept entirely on dry food, such as grain principally, are subject to it; also that young cattle are more apt to have it than cattle well matured. Cattle, however, are not as much subject to this disease as horses and some other of the domestic animals.

*The symptoms* are restlessness, with groans and apparent suffering. The animal will lie down and get up frequently, showing great uneasiness; the body becomes bloated, the swelling being most apparent on the left side. When the cause is constipation, the treatment should be mainly in the use of purgatives, clysters, and rubbing. For a purgative in such cases we would advise the following:

To one quart of warm water, add one pint of molasses, eight ounces of linseed oil, and half an ounce of powdered ginger. Mix well, and give in one dose. With the above it would be well to give an injection as follows: To two quarts of blood-warm water, add six ounces of olive oil or melted lard. If the colic should be attended from the first with a watery and unnatural discharge from the bowels, the following may be given as a regulator: Tincture of opium, 6 drachms; spirit of nitrous ether, 2 ounces; oil of turpentine, 1 ounce; water, 1 pint. Mix thoroughly and give in one dose.

From the beginning of the attack the animal should be rubbed well with flannel cloths, or brushes, such friction often giving great relief. If the pain continues very acute, rub mustard paste made of ground mustard, mixed with vinegar, over the under part of the body. Feed for several days, with care, on warm mashies and other soft diet, avoiding food of any kind that will have a tendency to irritate the bowels.

**Congestion of the Brain.**—The usual cause of this disease is a redundancy of blood in the system, the result of overfeeding, or a sudden change from a poor to a rich diet. It is in some instances caused by intense heat; oxen overworked in excessively hot weather will be liable to its attack. This disease is of comparatively rare occurrence. The symptoms are a peculiar wildness and anxiety in the animal's looks, attended with a nervous restlessness, frequent starting and groaning as though in great pain, suddenly lying down, and quickly rising to its feet again. The respiration is slow and labored, there being intervals when breathing seems to be entirely suspended. The movements of the patient are apparently attended with delirium. Sometimes there will be a fiery and frenzied look in the eye, followed by intervals of extreme languor and stupor; again the turf will be torn up by the feet, tossing it with the horns in the air, the whole physical system being under intense excitement. With these symptoms, lethargy eventually follows. When sudden frenzy is soon followed by lethargy, the case may be regarded as hopeless; but should there be a gradual subsidence, the pulse remaining normal, the animal may be regarded as on the road to recovery. Post mortem examinations of animals that have died of this disease uniformly exhibit an effusion of blood in the cavities of the brain, together with inflammation of the membranes of the brain, and a general congestion of the blood vessels.

There should always be prompt action in this disease. Bleeding from the jugular vein or temporal artery in quantity not less than two quarts for an ordinary ox or cow, will generally prove beneficial, but if the symptoms do not abate, this may be repeated a few hours later. After the bleeding, a blister applied to the top of the head, at the same time rubbing the sides of the neck with a mixture of cantharides and oil of turpentine, will have a tendency to relieve the brain. If the animal is constipated, relieve the bowels by injections and a mild dose of physic, such as Epsom salts, or linseed oil.

**Constipation.**—This is often the leading cause of many other diseases, since when long-continued it deranges the whole functions of the animal system. It is also the symptom of other diseases, and especially those of the liver. Farmers are generally too careless in observing the condition of their cattle in this respect, especially when they are confined in stables with little or no exercise, and fed mainly upon dry food. Cattle that have free range of pastures, or where soiling is practiced, and consequently are fed upon green food principally, generally require no attention in this respect. But when confined in stables, and fed upon dry feed, or in case of a sudden change from green to dry diet, there will be a tendency to a constipated condition of the bowels, which may require attention.

Constipation exists when there is not sufficient moisture in the stomach and bowels to maintain their healthy action, consequently the excrement will be retained for a longer time in the bowels, and be unnaturally compact and hard. This condition is caused or aggravated by too much dry food, an insufficient amount of water, and too little exercise. When long-continued, it is liable to terminate in inflammation of the bowels, colic, fever, etc., and is always an indication of some derangement of the system in man or beast. To correct this evil is a very easy and simple thing to be accomplished in the hands of an intelligent, ingenious person, who has a good amount of general knowledge and tact as a basis to work upon. The judicious use of bran, corn meal, ground oats, oil cake, roots, especially potatoes, and other laxative food, together with a plenty of pure water, will insure a perfect condition of the bowels, and continue to maintain this condition. Salt is also a great aid, and should be given

two or three times a week in winter, or be kept where all the animals can help themselves whenever they wish. When animals are allowed a liberal portion of salt, they will be induced to drink more freely, and when the bowels are in a torpid state, a large amount of water acts as a stimulus to the intestines in a manner similar to an injection of water, and will aid in softening and removing the impacted feces.

When it is desirable to produce an action of the bowels promptly by artificial means, we know of nothing better than an injection of lukewarm water, such an injection being useful and effective only in proportion to the amount of water used. A quantity of water sufficient to distend the bowels causes a contraction of the muscular coat of the intestines, which expels whatever they contain. A pint of linseed oil, or from a pint to a quart of melted lard will generally prove a good laxative. Those having the care of cattle should always note the condition of the excretions of these animals when stabled, and remember that it is just as important for the welfare and health of the stock that the refuse matter pass out of the system in the proper *time* and *condition*, as that animals should be fed at proper times with nutritious and suitable food.

**Cow-Pox or Vaccine Variola.**—This is a disease that locates in the udder and teats of the cow, and is similar in many respects to the small-pox in the human family. A cow inoculated with the virus of small-pox will have a disease identical with the cow-pox, while a person inoculated with the virus of cow-pox will have a disease similar to cow-pox, or that may be considered a very mild form of small-pox. To have either form of the disease is a protection against a subsequent attack for a period, sometimes for a few years only, and sometimes for a lifetime, varying with different individuals in this respect; hence arises the practice of inoculation for the prevention of small-pox established by Jenner, which is now recognized by all civilized nations. Cow or kine-pox sometimes seems to make its appearance spontaneously among the cows of a farm or neighborhood, but it is more probable that generally it is communicated from one cow to another by the hands of the milkers, the one first infected having it in a mild form, which is not observed until it is given to the others.

It is a specific blood poison that has a period of incubation of from four to nine days, the first symptoms being a fever for two or three days, after which it breaks out in pimples on the teats, udder, esentcheon, flanks, and sometimes around the vulva, nose, mouth, and eyes. These are of a bluish-red color at first, surrounded by inflammation, and continue to enlarge, forming a distinct vesicle, sometimes attaining even an inch in diameter. After a time a scab forms over it, the virus dries up, and the sores gradually heal. This is usually accomplished in from fifteen to twenty days. This disease very rarely terminates fatally, but while it continues is very troublesome on account of the discharge and inflammation of the udder and teats, the soreness of the teats rendering milking a very painful operation.

No special treatment is necessary except good nursing, and avoiding taking cold. The bowels should be kept open, and for this purpose it may be well at the commencement to give from half to three-quarters of a pound of Epsom salts, and feed on warm bran mash. If the teats are so sore and swollen as to render milking very painful and cause an injury or breaking of the skin, it will be necessary to draw the milk with a milking tube carefully inserted. This should first be warmed by inserting it in warm water, after which it should be oiled with olive oil and carefully passed up the teat. This should be done four or five times a day when the teats are very sore. When the udder is much swollen it will be well to bathe it in warm water, and apply a warm poultice of equal parts of ground flaxseed and bran. This can be held in place by means of a broad bandage, with holes for the teats.

**Cystitis.** (See INFLAMMATION OF THE BLADDER.)

**Diarrhea.**—This disease is brought on by too sudden change of diet, especially from dry to green, succulent food; also by improper food, or that of inferior quality, poisonous

plants, bad water, etc., and is most liable to occur in the spring and fall. It often accompanies other diseases, such as indigestion and dyspepsia. If slight, it may be but an effort of nature to throw off some injurious substance from the body; but if too long continued it is quite liable to debilitate the system, and run into dysentery, which is more difficult to cure. It is particularly fatal to young calves, among which it is most common.

A mild purgative should first be given in order to assist, rather than check nature in the operation of throwing off from the system what may be injurious. The laxative may be as follows: One-half pound of Epsom salts, one-half ounce of ginger, two drachms gentian, mixed with one pint of gruel; this will be sufficient for a medium-sized animal. This should be followed in a day or two by medicine of an astringent nature, such as two ounces of prepared chalk, one ounce powdered oak bark, two drachms ginger, two drachms powdered catechu; one-half drachm powdered opium, one ounce of peppermint water; mix and give in a quart of warm gruel or milk. Sometimes a few ounces of finely pulverized charcoal will prove a very good remedy. For calves, from two to four tablespoonfuls of the above mixture, according to the size of the calf, may be given at morning and night in milk or gruel. One or two tablespoonfuls of lime water mixed with the milk two or three times a day is excellent for young calves, with which an acid condition of the stomach is very common.

With calves, the treatment should generally commence with a laxative dose, such as two ounces of castor oil with a teaspoonful of powdered ginger, given in a half pint of milk. About four hours afterwards give the following dose two or three times per day, according to the condition of the patient: prepared chalk, two drachms, or one ounce of magnesia; ten grains powdered opium, half a drachm powdered catechu; two drachms tincture capsicum, a teaspoonful of essence of peppermint; mix and give twice a day in gruel or milk. An ounce of starch or arrow root, boiled until it thickens, to which, when cold, add a half tablespoonful of ground cinnamon and two scruples of Dover's powders, is an excellent remedy also for calves, given night and morning.

In this disease give good nursing and avoid exposure to cold or storms. Common diarrhœa may be distinguished from dysentery by a too abundant discharge from the bowels in too fluid a form, the discharge sometimes being bloody. In dysentery the discharge is frequently mixed with mucus and blood, and accompanied with hard straining, the discharge being less in quantity than in diarrhœa, but more offensive.

**Dysentery.**—The symptoms of this disease are watery, bloody, and offensive discharges from the bowels, attended with considerable fever, great thirst, loss of appetite, and frequent attacks of severe pain. The secretion of milk gradually ceases, and the animal rapidly loses flesh. A common diarrhœa will frequently, if neglected, terminate in dysentery. It is also sometimes the result of a cold that settles in the bowels, eating poisonous plants, or from a lack of a sufficient supply of nutritious food. Oxen that are overheated by hard work and turned into a pasture to be exposed to a cold storm, are peculiarly liable to an attack of this disease.

The patient with this ailment should be kept in a warm stable and have careful nursing, not being allowed to drink too much water, although a moderate supply may be given. The treatment should be similar to that recommended for diarrhœa. If the discharge should be very offensive, showing a badly diseased condition of the stomach and bowels, give the following, one-half by mouth and the other half by injection: One-half ounce chloride of lime; one-half ounce tincture of arnica; one ounce sulphuric ether, mixed with two quarts of starch gruel. Dry, sweet food should be given, such as fine hay, oat meal, boiled potatoes, linseed meal, etc. Water in which a pint of flaxseed has been boiled, or flaxseed gruel, is the best drink in such cases.

**Epilepsy.**—This disease is quite rare in full grown cattle, except in cows after calving, but is of more frequent occurrence in calves or young stock. The animal shivers, staggers,

and falls down; severe convulsions follow, with foaming at the mouth and stupor. Sometimes the attacks are slight and of but short duration, the animal getting up after a few moments apparently as well as before the attack. Recovery is seldom so complete, however, but that the animal will be liable to subsequent attacks. The general condition of the animal should be regarded in the treatment.

If the patient is constipated, as is usually the case, loosen the bowels with a moderate dose of some laxative, and give nourishing, soft, and easily digested food for a time. For a full grown animal the following is a good remedy in such cases: One-half ounce of bromide of potassium; one drachm of powdered gentian. To be given two or three times a day for a week or two.

Another quite effectual remedy is to give with a little water daily a drachm of iodide of potassium, mixed with an ounce of the tincture of colchicum. In all such cases careful feeding should be adhered to.

**Fouls.**—When fed in low, wet pastures, or kept in wet, filthy stables, cattle and other stock are apt to have a disease of the feet, commonly known as the “fouls,” or “foul in the foot.” In sheep it is known as “foot rot.” It usually makes its appearance between the claws of the hoof. Sometimes its first appearance is in the form of a swelling near the top of the hoof, which breaks and discharges a fetid pus. It is often very painful, causing severe lameness and loss of flesh and health to the animal, and should be treated promptly.

Remove the animal to a dry pasture, or a warm, clean stable. The soft spongy parts can be easily removed with the knife; this should first be done, and the parts thoroughly cleansed with castile soap and warm water; this to be followed by a thorough application of carbolic acid in the proportion of one part acid to eight parts of water.

Another method of practice is to cleanse the feet thoroughly as above recommended, and apply an ointment composed of one part of chloride of lime and four parts of fresh lard; or apply with a feather a solution of from ten to twenty grains of chloride of zinc in an ounce of water. A dressing of one ounce of sulphate of iron and four ounces of molasses, simmered over a slow fire till well mixed, and when cool applied to a piece of cotton or soft sponge, and secured upon the parts, will sometimes prove an excellent remedy. If any morbid growth or fungus should appear, apply equal parts of powdered bloodroot and alum sprinkled on the sore. This will generally effect a cure, even in obstinate cases.

It will be found beneficial in some cases to give a laxative in the form of Glauber's salts or Epsom salts, three-quarters of a pound dissolved in a quart of warm water, to which may be added a half-ounce of powdered ginger. Cleanliness in all the surroundings will prove an important adjunct in obtaining a quick recovery.

**Fractures.**—A fractured bone in an animal is generally a difficult thing to manage, owing to the difficulty of keeping the patient quiet for a sufficient length of time for the fractured parts to become united. As a rule, however, a broken bone is more easily repaired in cattle than with horses, owing to their being less nervous and restless. The treatment for fractures in cattle is essentially the same as for horses, which see (Vol. I, page 813).

**Garget.**—This is an inflammation of the udder, which affects one or more of its quarters; sometimes, in severe cases, involving the whole system. The inflammation is, however, generally confined to one or two sections of the udder, but in any case is a serious evil, and renders many valuable cows nearly worthless for milking purposes.

The affected part becomes inflamed and swollen, of an unnaturally high temperature, very tender and painful. The milk coagulates or hardens in the udder, producing inflammation wherever it is deposited, accompanied with fever. There will be a loss of appetite, chills, followed by fever, and a disordered state of the bowels. The milk will be thick, and sometimes bloody. The inflamed portions of the udder sometimes suppurate and break, dis-

charging a bloody pus. Even in mild cases the secretion of milk is considerably lessened, and in severe cases is often stopped altogether. In such cases also, the hip-joint, hock, or fetlock of the animal is frequently so swollen and sore as to entirely prevent her rising and standing.

This disease is most liable to occur in young cows just before calving, especially where they are large milkers and are kept in high condition. As the young cow approaches the period of parturition the udder undergoes a rapid and wonderful transformation to prepare it for supplying nourishment for the progeny soon to make its appearance in the world. The glands, which before have been small and undeveloped, increase to many times their former size, their blood vessels are enlarged, and the flow of blood through them greatly increased, while the wonderful power of milk secretion is perfected and carried on.

When there is danger of inflammation, by the udder being large and full before calving, it is well to draw a little milk each day a few days before parturition, in order to relieve the distended udder. This will sometimes be a necessity with heavy milkers in order to avoid difficulty in this respect, but it should never be practiced except when the conditions are such as require it. The udder should therefore be examined each day at this period, and if found to be hot, hard, and engorged with milk, a portion of the contents should be immediately drawn to encourage further secretion. This process will sometimes hasten the advent of the calf a day or two, but that is a minor evil compared with the result of running the risk of the animal having the garget.

Neglect for a few days after calving or when a cow is drying off, or the milking is abruptly stopped for other reasons, will also have a tendency to produce garget. Overstocking a heifer, in order to make her have a fine show of milk, is a barbarous as well as very risky practice, scarcely ever failing to bring on serious results, and is one of the most prolific causes of garget. We have known dealers in dairy stock to permit cows to be left from sixteen to twenty-four hours without milking, in order to give them the appearance of being excessively heavy milkers.

The writer knows of a very noted cow, valued at several hundred dollars, that recently died from the effects of such treatment. In such cases the udder becomes not only engorged with milk, but is congested with blood, a state which renders it at once fitted for the seat of disease. Failing to milk a cow clean will also bring on the garget. Besides those already mentioned, there are other causes of garget, among which are mechanical injuries, such as blows, kicks, wounds by the horns of other cattle, or bruises by the head or teeth of the calf; bites of insects, the practice of milking with wet hands and leaving the teats to dry, violent pulling or dragging upon the teats when milking, etc.; also wounds in the interior of the teat, resulting from the unskillful use of teat tubes and milking machines. Among other local causes of garget might be mentioned taking cold by wading in cold water, lying on the wet ground, on snow, or cold stones, exposure to cold rains, etc.

Finally, whatever induces derangement of the health of the animal system, with fever, tends to garget. For a few days before and after calving, cows, especially heavy milkers, should be kept on light food, and such as is not rich in nitrogenous elements or fats. A lukewarm bran mash or gruel that may be drunk by the cow in two pails in quantity per day, for three or four days after calving, is a safe as well as refreshing food. The bowels must be kept open by suitable food, or by mild laxatives, such as a daily dose of from four to six ounces of Epsom salts. In cases where the udder is gorged or overstocked, as where the cow has been lost for a day or more, the milk should be immediately drawn, if practicable, gently rubbing the udder with the dry hand for a few moments at a time, and stopping at intervals to draw the milk. Sweet oil well rubbed in helps to soften the gland tissue in such cases. In serious cases, camphorated spirits of wine is an excellent remedy for bathing the udder. Where the disease is very obstinate, tincture of iodine will be found beneficial

added to the camphorated spirits of wine, in quantity of one part iodine to four parts of the latter; this should be thoroughly mixed, freely applied, and well rubbed over the udder three or four times a day. With the last mentioned mixture it will be well to give once a day from half of an ounce to an ounce of saltpetre with the food or water, the quantity to be proportioned to the size of the animal.

A liniment composed of one part iodine, one part ammonia, and one part vinegar is also excellent for rubbing upon the udder to reduce the inflammation. In addition to this treatment it is well to permit the calf to run with the cow; this will keep the milk reduced in the udder and relieve the congestion. Sometimes the udder is so swollen that the cow will not permit the calf to draw the milk. If the inflammation increases and becomes general, with a high fever and occasional fits of shivering, give a dose of four or five ounces of gin or whisky in two or three quarts of warm water; also an injection of warm water. Cover the whole body with a heavy blanket or quilt, wrung out of as hot water as the animal will bear. Over this put on dry blankets; this will cause a profuse perspiration which will have a tendency to break up the fever. After sweating from half to three-quarters of an hour (which should be done in a warm stable), remove the blankets and rub the skin dry, avoiding a draft or anything that will cause a chill, or the temperature of the body to become much reduced. Then cover the body with a dry blanket. It may be necessary in some cases to give a dose of purging medicine, such as from three-fourths of a pound to a pound of Epsom salts, a half ounce of powdered ginger, half ounce of nitrate of potassa; mix and dissolve in a quart of boiling water; then add a gill of molasses, and give it to the cow lukewarm.

When the udder is much inflamed, a poultice may be applied which may be arranged into holes in the bandage for the teats, and fastened over the back of the animal with a strap to hold it in place. A water bag, as recommended in the treatment of puerperal or milk fever is also excellent. When the udder suppurates, the matter should not be left to be absorbed into the system, but if the poultice does not cause such swollen places to break, they should be opened with a sharp knife or lance, and the matter be permitted to escape. A cow that has once been attacked with this disease is liable to have it afterwards whenever she calves, and to grow worse in this respect instead of better. A slight attack even is injurious, and great pains should be taken with heifers about to drop their first calf, in order to prevent an attack at the time of all others that they are most predisposed to it. No matter how valuable a cow may be, if even one teat, or one fourth of the udder is affected, her usefulness as a milker is greatly impaired. Prevention in all cases of this kind is therefore worthy of more consideration with the farmer than the curative remedies for the disease.

**Glossitis.**—This is an inflammation of the tongue, and is frequently due to some injury to that organ, such as wounds from foreign bodies in the food, gravel, thorns, etc.; in other cases it is sometimes caused by the action of mercury on the system, that has been given as medicine. The tongue becomes greatly inflamed and swollen, and the chief danger is from suffocation by the swelling of the parts around the hyoid bone, thus closing the glottis. Temporary or partial permanent paralysis of the tongue is sometimes occasioned by it, in which case the tongue hangs from the mouth an apparently lifeless appendage. The tongue should be carefully examined, and if there be any foreign substance in or about it, it should be removed; afterwards bathe the tongue freely in warm water.

It may be well also in the same connection to scarify it, making a few cuts in order to make it bleed a little to reduce the inflammation. Give a laxative dose of about a pound of Epsom salts dissolved in a quart of warm gruel, to which is added a half-ounce of powdered ginger. The mouth should be frequently fomented with warm water and syringed out afterwards with a mixture of vinegar and water, or a solution of a teaspoonful of alum to a half-pint of water. The animal should be kept in a cool stable free from flies, and have constant access to pure cold water, that it may drink whenever it likes. The stable should

be clean and dry, and supplied with a good bed of leaves or straw. For food give that which can be readily eaten, such as warm mash, gruel, fresh cut grass, fruit, etc. Prompt attention and good nursing will soon relieve the difficulty.

**Grub.**—The gad-fly is very troublesome to stock towards the latter part of summer. This fly alights on cattle usually along the back, pierces the skin, and deposits its eggs underneath it. The egg hatches under the warm skin, a tumor or lump is thus formed, which soon bursts and leaves a small hole for the larva or grub of the fly thus hatched to breathe through. The larva here feeds on its surroundings, and grows to a considerable size. These grubs are sometimes called warbles. The pain that the gad-fly inflicts in depositing its eggs is so severe that cattle dread the insect instinctively; and when an animal is attacked it will often show great fear and excitement, running from the rest of the herd, making a direct course for the water, underbrush, or some other retreat, where it can escape.

The presence of the larvae under the skin causes considerable pain and annoyance, and the animal thus affected tries to lick or rub, if possible, the parts where they are located. The remedy is to remove or destroy the larvae. They can be distinguished by little lumps or tumors under the skin, each of which contains a grub or larva, and may be pressed out with the thumb and finger. They can, however, better be removed by enlarging the orifice with the point of a penknife or lancet, when they can be easily pressed out. They injure the hide of the animal, besides being of great annoyance. Rubbing the parts affected with turpentine or common kerosene oil will kill the larvae. Where cattle have been bitten by this fly, an early application of a mixture of two parts of tar, with four parts of lard well rubbed in over the bites, will usually end the difficulty at once.

**Haematuria.**—This disease is known by different names, such as "red-water," "black-water," "bloody urine," etc., the name being derived from the color of the urine, which varies from a pale pink to a bloody tint, varying in all the shades to a dark brown, the color being attributed to the presence of large quantities of albumen and iron, and the coloring matter of the blood. As the quantity of albumen and iron increases, the color darkens. When once fairly developed, this disease is apt to be very fatal among cattle. The symptoms are a rapid decline in milk secretion, constipation, feverish excitement, loss of appetite, rapid pulse, and irregular action of the heart. Sometimes it commences with a diarrhoea, which is succeeded by constipation.

Very soon after the attack the color of the urine will indicate the nature of the disease. Animals affected with it are dejected and stupid in appearance, and show a reluctance to move. It is sometimes attended, as the disease progresses, with a discharge from the eyes and nose, while the urine assumes a darker color, being sometimes nearly black. Examinations after death show the liver, kidneys, intestines, and in some cases, the brain, to be affected. In fatal cases the animal usually dies in two or three days after the attack.

It is found that cattle are most subject to it in the late summer, and it is usually confined to the animals that are out of doors, and are pastured on low, swampy lands. It is no doubt frequently caused by drinking impure water, eating improper food, by a change of pasture, climate, or food, particularly when such changes are from high to low lands. It is sometimes produced by blows and harsh treatment, the external violence injuring the loins and kidneys. When this is the cause, it may be distinguished by the blood passing in little clots distinct from the urine. Eating acrid herbage will sometimes cause this disease, also the excessive use of diuretics.

It is frequently attended with fever, and is apt to run into inflammation of the kidneys. When the difficulty is the result of external violence, which produces what is termed *Traumatic Haematuria*, keep the parts as cool as possible by laying cloths wet in cold water.

over the loins, and if there is any constipation, give mild laxatives, and laxative food to keep the bowels open. Oil cake and bran mash are excellent at such times. When the disease is of the idiopathic type, the treatment should be the same as for Albuminuria. Mustard paste well rubbed about the loins is excellent. The best remedy will be found in avoiding the conditions that cause the disease, by having improved sanitary regulations, supplying the animal with pure water, and wholesome, nutritious food.

**Hernia.**—This is commonly termed rupture, and denotes a protrusion of the bowels or their membranous covering through an opening of the abdomen, which may become accidentally torn, the result of external injury or of severe straining. When a large portion of the intestines is thus misplaced and protruded, what is known as strangulated hernia results, which will cause inflammation and death unless it can be reduced in a short time. When the enlargement is slight, it can be easily pushed back and held in its place by passing a strap or bandage about the body with considerable pressure, the same being held in its proper place by being connected by a strap along the back and under the belly, with one around the neck; the strap along the back being made to pass under the tail like a crupper, while the connections under the belly keep it from slipping too far back. When the enlargement is great, a cure is not so easily affected.

Sometimes the rupture is of such a nature that there is a protrusion into the scrotum. Umbilical hernia,—or hernia at the navel,—is sometimes seen in calves at birth. Such cases can usually be remedied in the same way as previously recommended, but if it fail, wooden clamps are generally applied in such a manner as to include the skin over the rupture and tight enough to cause some inflammation.

Scrotal hernia,—or hernia of the scrotum,—is very difficult to reduce. A careful castration by what is known the "covered process" is sometimes necessary in such cases, which should never be attempted by any one but a skillful veterinary surgeon.

**Hoose or Husk.**—This difficulty is caused by a species of worms, the eggs being swallowed by the animal when grazing, especially in low, wet pastures. The symptoms are similar to those of bronchitis. There will first be a dry, husky, spasmodic cough, which eventually becomes more frequent and troublesome, attended at times with a discharge of mucus. Small worms will also be coughed up, sometimes singly, and sometimes in little balls or twined together. Remove the cattle to well drained pastures, and see that they are supplied with an abundance of pure water. Feed liberally with the most nutritious food, giving linseed or cotton cake, potatoes, carrots, bran, and such diet as will keep the bowels from being constipated. A moderate dose of sulphur for a few days will sometimes prove beneficial. The observance of sanitary conditions, good care, and nutritious food are the best means to be adopted in such cases.

**Hoven.**—This is an unnatural distention of the digestive organs with gas which is produced by the fermentation of the food in the stomach, and accompanies indigestion. It is usually caused by overfeeding on green succulent diet, especially clover, which is apt to be eaten very greedily, and in too large quantities by cattle after they have been kept for a long time on hay, and other dry food. The stomach is therefore very apt in such cases to become overloaded and clogged, which results in indigestion, as the stomach ceases to have power to act upon the compacted mass. Here it becomes moist and warm, begins to ferment, and produces a gas which distends the stomach to an enormous size, causing intense pain to the animal, the breathing being difficult, as though nearly suffocating. In severe cases, unless relief is given promptly, death soon follows from either suffocation, rupture of the coats of the stomach, or blood poisoning by the gases. Medicine is useless in such cases unless given in the very first stages. When given prompt attention, four drachms of chloride of lime in a little water will sometimes give relief by neutralizing the gas.

Ammonia, which is generally near at hand, given in quantity of two ounces in a quart of water every fifteen minutes until the animal is relieved, is an excellent remedy. Injections of warm water should always be given in the same connection. A hollow flexible tube introduced into the gullet will sometimes afford a little temporary relief until other remedies can be tried, by allowing a portion of the gas to escape. In case there is no relief from other remedies, it may be necessary to make an opening into the stomach and permit the gas to escape by this means, the latter being the best resort, and although sometimes a dangerous remedy, it is usually attended with good results.

Veterinary surgeons use for this an instrument called the trocar, which is the best for this purpose, but if one cannot be conveniently obtained (as delay may prove fatal), a sharp pointed pocket knife will answer the purpose very well. The incision must be made on the *left* side, about three inches below the spinal column, and about half way between the last rib and the point of the hip. The trocar or knife should be plunged in and downward, letting it pass in obliquely to avoid wounding the kidney. When the knife is used, a quill must be inserted in the opening through which the gas will soon escape, the hissing sound of its escape being distinctly heard. When food gets over the end of the tube or quill so as to obstruct it, a small piece of whalebone should be passed in to remove the obstruction and keep it open.

After the gas has escaped, the edges of the wound should be fastened together with a stitch of strong silk, or drawn together and held with an adhesive plaster. A purgative should follow, to remove the fermented food from the stomach, consisting of twelve ounces of Epsom salts, ginger one ounce, molasses four ounces, mixed with two quarts of water, and given in one dose for a full grown animal. The food should be light for several days. The prevention of this difficulty is never to permit cattle to have a sudden change of food, and thus gorge themselves. They should always have a gradual change from hay to grass, and at any time when turned into rank feed, such as the mowing lands in autumn (a practice not to be recommended, but very common in some sections), they should be allowed to remain but an hour or two for the first three or four days, until they have become accustomed to it. Changes from hay to grass, or from grass to hay should always be gradual, as well as that from short pastures to luxuriant mowing lands and clover fields.

**Inflammation of the Bladder.**—This is an inflammation of the mucus membrane lining the bladder, and is generally caused by some derangement of the digestive organs, such as the eating of poisonous plants, the drinking of impure water, an overdose, or too long-continued use of diuretic medicines, the use of cantharides, etc. The symptoms are pains similar to those in colic, the water is passed with difficulty and pain, it is albuminous in character and frequently scanty in quantity; at other times urination is unnaturally frequent; there is a loss of appetite, and the whole system seems disturbed and weakened. Give flax-seed tea or gruel in large quantities. Gum arabic water and slippery elm tea are also good. Warm water injections are highly beneficial and soothing, and if there is constipation, a mild cathartic should be administered. Apply cloths wet in hot water to the loins, over the region of the bladder, and keep the patient warm and quiet. Avoid constipating food. Warm bran mash and food of a soft and moist character should be given.

**Inflammation of the Brain.** (See CONGESTION OF THE BRAIN.)

**Inflammation of the Kidneys.**—This is caused by taking cold, by external violence, strains, eating poisonous or diuretic plants, etc. The symptoms are similar in many respects to those of inflammation of the bladder, except that the urine is thick and dark-colored, and voided frequently in small quantities, with straining and evident pain. The hind feet are carried unnaturally far apart, showing great soreness and tenderness of the kidneys, while lameness is sometimes apparent in one or both of the hind legs. There will be considerable

fewer, and sometimes in the later stages blood and pusy matter are mixed with the urine. The treatment should be identical with that for inflammation of the bladder, previously recommended. It is an obstinate disease to cure, and is very liable to recur on the slightest exposure to storms, changes of temperature, etc.

**Inflammation of the Liver.** — Animals that are kept in full flesh are most subject to this disease, it being frequently brought on by overfeeding. Sudden changes of weather, or cooling off too quickly when overheated will be liable to bring it on. Blows, kicks, or other external injuries that animals too frequently receive from thoughtless and cruel men having charge of them will also cause this disease. The symptoms are similar to those of jaundice or yellows, and the treatment should be the same. If the animal has been fed too high and is consequently suffering from surfeit, give a less quantity of nutritious food for a time. When the difficulty is caused by external violence, the patient should have a local treatment of the bruised part, the same as is recommended for bruises or contusions.

**Inflammation of the Lungs.** (See PNEUMONIA.)

**Inflammation of the Udder.** (See GARGET.)

**Inversion of the Uterus.** — This is not of very frequent occurrence, although it is apt to result fatally when it occurs, if the services of an experienced veterinary surgeon, or a person skilled in the successful treatment of such cases cannot be readily obtained. It frequently happens that farmers are so situated that they cannot easily obtain such service, and as prompt action in all cases of this kind are essential, valuable animals are sometimes lost from lack of timely assistance. It is, therefore, important that every farmer and stock owner should understand the proper treatment in such an emergency.

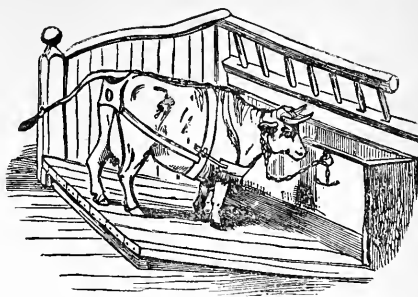
Inversion of the uterus or womb, is liable to occur at the time of calving or immediately after, and is generally occasioned by the violent expulsive action of that organ at the very moment of expelling the calf; and also by the adhesion of the placenta or after-birth, by which means in the process of delivery the uterus is sometimes turned inside out, and hangs in an enormous mass from the body. This is, of course, a serious accident, and no time should be lost in returning it as soon as possible; yet it must also be done in the most gentle and careful manner, or fatal consequences will be the result. It is a delicate operation, and any rupture of the membrane, by pushing the fingers through it, etc., would cause death.

The head of the animal should be secured, and the hind-quarters raised a foot or more by placing something under the hind feet, if the cow is standing; if not, the hind-quarters should be raised in this manner. Get a clean bed-sheet and a pailful of blood-warm milk and water, about half and half in proportion, and a clean sponge. Dip the sheet in the milk and water until it is well wet, and lay it carefully under the protruding mass; it will require a man on either side to support it, while a third carefully sponges off any dirt or foreign substance that may be adhering to it. When thoroughly cleaned, sponge the uterus over lightly with laudanum, and carefully return it to its place. This may be done by two methods: by pushing the lowest part with the closed fist in the direction of the vulva, (first oiling the hands and arm thoroughly with sweet oil or clean, fresh lard,) while the uterus is being held up with the sheet by the two assistants, pushing the arm at full length into the body of the cow, taking the greatest care not to use violence; the uterus will usually go back into its place without much difficulty.

Another method which is preferred to the former by some, is to carefully grasp the part nearest the body with both hands, and then gently knead the parts inward, first with one hand and then with the other, until it is all replaced. If the hind-quarters are raised sufficiently high, and the uterus well lifted upon the sheet, it will slip back into its place readily with a little manipulation.

It will be well to give the cow two or three ounces of laudanum before commencing the operation, as it will quiet the animal, and also suppress violent straining, which will naturally occur under such circumstances, and will prove quite troublesome to the operator.

After replacing the uterus, inject, or carry with a sponge, into it an ounce of laudanum. This will obviate the tendency to expel the uterus again after replacing it. If any portion of the placenta is adhering to the uterus, it should be carefully removed before returning it to its place. To prevent inversion again, let the animal continue to have her hind-quarters elevated from



TO PREVENT INVERSION OF THE VAGINA.

six to nine inches higher than the fore-quarters; then with a little ingenuity, a kind of breech strap could be devised with a large pad upon it, so arranged as to press upon the vulva and prevent the expulsion of the uterus, as shown in the above cut.

#### **Itch.** (See MANGE.)

**Jaundice, or Yellows.**—This is originally caused by a debilitated state of the stomach, which involves eventually a derangement of the liver. In this disease the bile ducts are obstructed, in consequence of which the bile is taken up by the lymphatic absorbents and conveyed to the blood, where it is carried to all parts of the body. The symptoms are a yellow tint of the white of the eye, the whole skin finally assuming the same hue. There is a weakness and general debility of the entire system, attended with constipation and loss of appetite, the animal seeming dull, with a disinclination to move about. When milch cows are attacked with this disease, the secretion of milk becomes lessened, it is of rank flavor, and frequently damages the butter of a whole dairy. This disease is difficult to cure when far advanced, as the liver becomes much diseased. In the early stages moderate laxatives are to be recommended. The following mixture will prove of great benefit, and usually effect a cure at this period:

Carbonate of soda, two drachms; cascarilla bark, three drachms; ginger, three drachms; to be given in a pint of ale. This may be repeated after four or five days.

The following drink should be given each morning and evening:

Venice turpentine, one-half ounce; powdered ginger, three drachms; powdered gentian root, one ounce; Castile soap, half an ounce; rub the turpentine and soap together in a mortar until thoroughly mixed, after which add the ginger and gentian.

The food should be easy of digestion and watery in character, such as roots, warm mash, fresh grass, etc., and an abundant supply of water. It frequently happens that an animal will be entirely cured of this difficulty by being turned out to fresh grass. Exposure to cold storms should be avoided in this disease. Rubbing the whole body, especially the belly, two or three times a day, will be a great benefit.

**Laryngitis, or Common Sore Throat.**—This is an inflammation of the larynx or upper portion of the windpipe, usually attended with considerable swelling of the throat, sometimes to such an extent as to render swallowing difficult. It is also attended with a feverish state of the whole body. Mustard paste, or a mixture of ground mustard and vinegar, should be well rubbed externally upon the throat in the region of the larynx. After two or three hours it may be washed off and a fresh supply rubbed in. If this does not reduce the

swelling, a linseed poultice should be applied warm and soft, and frequently changed in order to keep it warm. This will induce suppuration. In the same connection, give a tablespoonful of saltpetre dissolved in the water that is drunk, morning and night. A little of the following mixture should be syringed well down into the throat several times a day: two ounces chlorate of potash, dissolved in one quart of water.

**Leakage of Teats.**—A very safe practice to prevent this evil, is to procure some collodion of a druggist, and as soon as the milking is over, cover the end of the teat with a film of it. This dries almost instantly, shrinking as it dries, thus closing the opening so gently as not to be injurious, and which will break away in milking. The use of elastic bands around the teats, or any mechanical device that compresses them, will prove injurious.

**Leucorrhœa, or Whites.**—This is by no means a common difficulty with cows, and is rarely attended with very serious consequences, except in extreme cases, when it reduces the flesh and strength of the animal considerably. Such cows are never good breeders, being very liable to abort.

It is simply a catarrh of the vagina and womb that is attended with a discharge of a whitish fluid of a mucopurulent nature, and exceedingly offensive in odor. In slight cases, the frequent use of the syringe for a few days with warm water will generally end the difficulty.

When the discharge is profuse, or is caused,—as is sometimes the case,—by the retention of the after-birth at calving, the treatment should be as follows: Syringe thoroughly with lukewarm water; afterwards give two injections a day of weak tea of white oak bark, or what is better, a solution of carbolic acid, consisting of one part acid to eight parts water. In connection with the same, the following combination will be found beneficial. Two ounces of powdered cubebs, three ounces powdered gentian root, one ounce of powdered sulphate of iron, and two ounces of marshmallow root. Mix, and divide into four parts, giving one part mixed with a little water into a paste, by smearing it upon the root of the tongue at morning and night for two successive days. After an interval of two or three days repeat the same as before, continuing the treatment every alternate two days as long as it may seem necessary.

**Lice.**—These are the most common parasites with which cattle are afflicted, yet they



OX LOUSE.



CALF LOUSE.



BIRD LOUSE.

will rarely be found, especially to any extent, where the proper sanitary conditions in cleanliness are observed. Cattle that are worried and annoyed by lice will never be thrifty, however well they may be fed.

There are various species of lice that infest the ox, the principal of which are the common ox louse, the calf louse (both being a species of *Haematopinus*, or blood-suckers),

and a species of bird louse, *Trichodectes*, which has no sucking tube, but strong biting jaws. The above cuts represent these parasites considerably magnified. Besides these, there is a kind of ox tick that is quite troublesome in some sections during certain seasons, and which are more common on Texas cattle than others.

Since the prevention of parasites is much more easy than their extermination when once they have made their appearance, every precaution should be used, and a sharp look out kept for them; all the more so if stock are for any reason a little out of condition. Stock that are kept well fed and in a thriving condition are less liable to vermin of any kind than those but indifferently cared for, while vermin are very apt to be found in ill-kept, filthy stables. Never permit fowls to roost in stables or sheds near or in which horses or cattle are kept, as lice from the former may be communicated to the latter very readily. Almost any kind of grease is destructive to this species of vermin, lard being frequently used for this purpose.

This may be applied along the spine and on the neck, shoulders, and sides of the body, being well rubbed into the coat. The lard should be applied warm, and a warm pleasant day be selected for the treatment. It is a good plan to mix one-third quantity of common kerosene oil with the lard. This causes it to spread better and penetrate into all the wrinkles of the skin, and such hiding places as lice are apt to collect; besides kerosene is very destructive to vermin. If kerosene is used alone for this purpose, it will irritate the skin and cause the hair to come off badly. Cattle thus treated will look in a few days as though they they had been scalded in patches. A little sulphur is also good to mix with the lard, especially if the skin is scurfy. Three parts of linseed oil and one of kerosene, well mixed, is also a good remedy for exterminating lice.

This can be put into a large spring-bottomed oil can, and easily applied by moving the point along close to the skin, and springing the point at each move. If the first application does not prove effectual, a second will generally complete the work. Tobacco steeped two or three hours in water, in the proportion of two pounds of tobacco to from five to four gallons of water, is also a good remedy. Apply thoroughly with a sponge. An infusion of quassia, made by steeping quassia chips, may also be applied in the same manner with great effect.

**Loss of Cud.**—In many of the diseases of cattle, the functions of digestion become more or less disturbed, and the act of regurgitation and remastication or "chewing of the cud," becomes temporarily suspended, which condition is commonly termed "loss of cud." This is sometimes brought on by the animal eating too much of food to which it is not accustomed, producing indigestion. It may be caused by any disease of the stomach, or liver, and is sometimes the result of a sympathetic fever setting in after a surgical operation, or a bad wound. There is, therefore, strictly speaking, no such disease as "loss of cud," but the term denotes a condition of the system brought on by various causes. The treatment must necessarily vary with the nature of the disease which caused the impaired digestion.

When the disease producing this condition is known, the cause should be removed by giving remedies for that specific disease. If there is no apparent cause, a moderate laxative, such as a pint of raw linseed oil or melted lard, a medium dose of salts is to be recommended, together with careful attention to diet and careful nursing. The following in such cases is a very good medicine to be given twice a day in a quart of warm stock ale: Powdered gentian, two ounces; powdered ginger, one ounce; sulphur, two ounces; powdered sulphate of iron, one-half ounce; mix. When surfeiting seems to be the only cause, simply withholding the food entirely, or in part, until the system can regulate itself, will usually bring about the proper conditions.

The animal in all cases should have all the pure water it will drink, with free access to salt. Warm bran mashies are good, especially where a constipated condition of the

bowels exists. Give also a moderate quantity of cut vegetables or apples. Where much debility exists, the following tonic will prove beneficial, given in quantity of a tablespoonful morning and night, mixed among slightly moistened oats: powdered sulphate of iron, four ounces; and ten ounces each of gentian, ginger, and linseed meal mixed together. The normal condition of cud-chewing will be re-established only when the animal's condition is considerably improved, the above treatment being intended to assist in resuming all the natural functions. As this disease is frequently slow of development, the cure will also sometimes require considerable time for a complete recovery.

**Malignant Sore Throat.**—This is an acute inflammation of the throat, accompanied with swelling, which is apt to cause suffocation by pressure upon the lungs, being frequently fatal in its results with cattle, horses, and swine. The flesh of cattle or swine affected with this disease is very poisonous, producing a putrid state of the blood in those eating it. The carcasses of all animals dying with it should be deeply buried, with as little handling as possible.

It generally commences like a common cold, accompanied with some fever, shivering, and a cough; the throat swells enormously, the tongue sometimes protruding from the mouth, and is covered with purple or black spots. The disease usually reaches its extreme height in three or four days, the animal dying of suffocation. Early treatment of the proper kind will sometimes effect a cure. Apply the following liniment twice a day, well rubbed in about the throat and neck: liquid of ammonia, one ounce; oil of turpentine, one ounce; linseed oil, one ounce. In the same connection, inject well down the throat several times a day a little of the following solution: one ounce of chlorate of potash, dissolved in one pint of water. Warm poultices should be kept about the throat, such as those made of flax seed, meal, or bran. These will induce suppuration, and also reduce the swelling.

**Mammitis.** (See GARGET.)

**Mange.**—There are a variety of parasitic insects that are apt to infect cattle and all domestic animals that are ill-fed, and kept in a filthy condition. These burrow in the skin and produce intense itching, causing the animal thus affected to be rubbing against posts, fences, the sides of the manger, or anything that can be conveniently used for that purpose. In this way, as well as by personal contact, the disease is communicated through the herd. It is generally brought on by a half-starved, filthy condition, and shows great neglect and slovenliness in management. The treatment for this disease in cattle should be the same as for mange in horses, which see.

**Milk Fever.** (See PUERPERAL FEVER.)

**Nephritis.** (See INFLAMMATION OF THE KIDNEYS.)

**Ophthalmia.**—Cattle are subject to fewer diseases of the eye than horses, the most common being inflammation of the lids from exposure to cold, the introduction of foreign substances, or from external injuries, such as scratches from thorns, brush, blows from the horns of other cattle, etc. The eye should be closely examined, and if there be any foreign body there that is the cause of the inflammation, it should be removed, if possible, and the eye bathed several times a day in luke-warm milk and water, half of each being used in quantity. Sometimes the disease will result in a cataract, or the formation of a white film over the eyeball, producing total or partial blindness. The bowels should be kept open with mild purgatives.

If there is any opacity, or the formation of a white film over the eye, apply directly to it, morning and night, with a soft camel's hair brush, or feather, the following lotion: ten grains nitrate of silver, one ounce of water, thoroughly mixed. This treatment should be continued until the white film is gone, it being gradually absorbed by the lotion.

Another very good remedy, that will often prove successful, is to bathe the eye morning, noon, and night with a mixture as follows: Sulphate of zinc, twenty grains; acetate of lead, one drachm; tincture of opium, a half ounce; fluid extract of belladonna, two drachms; rain water, one pint; mix thoroughly.

**Pleuro-Pneumonia.**—This disease, sometimes known as “the lung plague,” and “cattle plague,” is one of the most contagious and fatal of all the diseases to which cattle are subject. It first appeared in an epizootic or contagious form among the cattle of Great Britain and Ireland, about the year 1841, although it had been known in the great cattle-breeding plains of Central and Northern Europe for ages. According to official reports more than a million of cattle died from this disease alone in the United Kingdom in the six years prior to 1860, the total value of which must have equaled, if not exceeded, \$70,000,000.

Dr. George Fleming, Interpreter of the Army Veterinary Department, says in this connection: “The lung plague costs us, at the very least, £2,000,000 a year.” Its introduction to this country was in 1843, in the vicinity of New York. It has gradually been disseminated along the Atlantic coast, although thus far restricted for the most part to the Middle States, Maryland, and a small portion of New England. It is to be hoped that more effective measures will be inaugurated by our Government than have hitherto been established for entirely stamping out this evil, and hereafter effectually preventing its introduction and spread.

Various experiments have been tried to counteract this disease, among which is that of inoculation as a protective measure, none of which have, however, thus far proved successful. It is a contagious fever, attended with local inflammation of the pleura, which is the thin membrane lining the thorax and investing the lungs, and is accompanied with great weakness and general prostration of the whole physical system, the more malignant types of the disease usually terminating fatally in a few days. It is, however, at other times so slow in its development that it may remain in the system for weeks before manifesting itself in any very marked outward symptoms. The early symptoms are a feverish state of the system, the temperature sometimes rising to 106°, accompanied with slight shivering, a loss of appetite, dry cough, scanty urine of dark color, and in cows also a drying up of the milk. This will be succeeded by soreness of the lungs, manifested by a pressure behind the ribs over the lungs, panting breath, and general attitude of the animal—the head drooping, nose extended, back arched, and hind legs drawn under the body. In the later stages of the disease there will sometimes be a constipated condition of the bowels; at other times the reverse, or a diarrhœa, the discharge being of a watery, fetid character. There will also be a watery discharge from the eyes and nose.

An examination of the lungs of animals that have died of this disease will frequently show large portions of them of a dark color, solid and elastic, of the consistence and weight of liver. Various remedies have been tested and recommended for this disease, but none as far as we are able to learn have proved successful. It is at least involving too great a risk for a farmer to attempt to cure an animal attacked with this disease himself; for while he is nursing and doctoring one animal, it is so terribly contagious that the entire herd are liable to be attacked by it. It is therefore safer to kill the animal at once as soon as the disease is known, and deeply bury the body as quickly as possible at a distance from any locality frequented by any of the herd, throwing over the body a quantity of quick-lime before covering it.

**Prevention.**—The preventive measures that have been recommended in relation to this disease are to suitably quarantine stock imported into this country for a period of time of sufficient length to determine with absolute certainty that there is no contagion of the kind about them; also the speedy destruction of all such as are affected, and the complete isolation of all such as have been exposed to the contagion. Inoculation with the liquid

extracted from the lungs of an animal affected with this disease is frequently resorted to in Europe, and in this country to a certain extent, but is in many respects unsatisfactory. Dr. Law recommends that stables and buildings where animals with this disease have been kept be cleaned and fumigated as follows:

"Remove all litter, manure, feed, and fodder, from the stables; scrape the walls and floor; wash them if necessary; remove all rotten wood. For buildings take chloride of lime one-half lb., crude carbolic acid four oz., and water one gallon; add freshly-burned quicklime till thick enough to make a good whitewash; whitewash with this the whole roof, walls, floors, posts, mangers, drains, and other fixtures in the cow stables. Wash so as to thoroughly cleanse all pails, buckets, stools, forks, shovels, brooms, and other movable articles used in the buildings; then wet them all over with a solution of carbolic acid one-half lb., water one gallon. When the empty building has been cleansed and disinfected as above, close the doors and windows, place in the center of the building a metallic dish holding one lb. flowers of sulphur; set fire to this and let the cow shed stand closed and filled with the fumes for at least two hours. The above should suffice for a close stable capable of holding twelve cows. For larger or very open buildings more will be required.

The manure from a stable where sick cattle have been kept must be turned over and mixed with quicklime, two bushels to every load; then hauled by horses to fields to which no cattle have access, and at once plowed under by horses. The pits, where the manure has been, must be cleansed and washed with the disinfectant fluid as for buildings. The surviving herd should be shut up in a close building for half an hour once or twice a day, and made to breathe the fumes of burning sulphur. Close doors and windows, place a piece of paper on a clean shovel, lay a few pinches of flowers of sulphur upon it, and set it on fire, adding more sulphur, pinch by pinch, as long as the cattle can stand it without coughing. Continue for a month.

Give two drachms powdered copperas, green vitriol, daily to each cow in meal or grains; or divide one pound copperas into fifty powders, and give one daily to each adult animal. Do not use for the surviving cattle any feed, fodder, or litter that has been in the same stable with the sick. They may safely be used for horses and sheep. In certain cases further measures are needed, as removal of the flooring and soil beneath, or even the burning of the entire structure. Drains must also be cleansed."

**Pneumonia.**—This is an inflammation of the lungs, and generally results from a severe cold, or is developed from bronchitis or inflammation of the larynx, the inflammation extending down into the lungs. It is more common among cattle and horses than any other of the domestic animals, frequently involving but one lung, and sometimes both. It is always accompanied with considerable fever, quick pulse, and rapid breathing. Sometimes the ears, roots of horns, and legs will be cold.

There are three stages of the disease, viz.: congestion or inflammation, the first stage; hepatization (the lung becoming solid), or second stage; and suppuration, or third stage. On a post mortem examination the diseased lung will frequently be found solid like liver.

Put the animal in a warm, well-ventilated stable, and if there be much fever, envelop the body in blankets wrung out in hot water, over which a rubber or dry blanket should be placed, to induce perspiration. It is also a good plan to put some hot bran mash in the bottom of a common nose basket, and allow the steam from it to be inhaled, or to cover the head with a blanket, and place a kettle containing something hot that will emit steam underneath. After keeping up a perspiration for about half an hour, remove the blankets, rub off dry with wisps of hay or straw, and cover for a time with a dry blanket to prevent a too sudden change of the temperature of the body. Great care should be used to prevent taking cold by a draft or other means. For further treatment, adopt that recommended for bronchitis, previously given.

**Puerperal Fever.**—This is usually caused by difficult parturition, exposure to cold soon after calving, retention of the placenta, harsh treatment, or overdriving shortly before calving, etc. Cows kept in high condition, and those that have been kept thin in flesh and suddenly transferred from this to an abundance of stimulating or succulent food near the time of dropping the calf are most liable to this disease. It is more liable to occur in hot weather, and is then most dangerous, it more frequently proving fatal at that season. It may come on at any time from a few hours after calving to the fourth or fifth day. Heavy milkers are most subject to it, but all cows generally have more or less fever at calving. If by neglect or improper treatment of any kind the secretion of milk is prevented, and the milk thus thrown back into the system, the inflammation, and hence the fever, is greatly increased.

A high fever with all its attendant symptoms is apparent in the early stages of this disease, the muzzle hot and dry, base of horns and extremities hot or cold, loss of appetite, ceasing to ruminate, countenance wild, eyes staring, restlessness, frequently lying down and getting up, colicky pains, urine scanty and high-colored, with a constipated condition of the bowels. Sometimes the mouth will be kept open, with the tongue hanging out at one side, the animal moans, and soon becomes irritable. When delirium follows, she grates her teeth, kicks at the belly, tosses her head about, and sometimes injures herself. The udder will be hot, swollen, and very tender from the first, attended by a suspension of milk. When the disease terminates fatally, the pains in the belly increase, prostration succeeds, and finally stupor and death follow.

A post mortem examination shows the womb and peritoneum greatly inflamed with occasionally purple spots. The brain also shows inflammation. A pound to a pound and a half of Epsom salts, according to the size and condition of the animal, should be given, dissolved in a quart of hot water; to which add one ounce of powdered ginger, one ounce powdered gentian root, a half pint of molasses; mix and give lukewarm. Give also injections of warm water. If this does not act on the bowels in a suitable time, repeat the dose.

In most types of milk fever the digestive organs are deranged, and the third stomach is loaded with indigestible food. It is therefore highly important that this condition should be counteracted as soon as possible, and purging when commenced at an early stage of the disease, will cause the fever to subside more readily. Rub mustard paste upon the belly to create a counter irritation, thus relieving the intense inflammation. If the animal from stupor should be unable to swallow, the stomach pump may be used in giving the purgative, to prevent the liquid from running down into the lungs.

If the udder is much swollen and hot, it will be well to treat it with the water bag, which is also very useful in treating garget. The bag should be made of oil-cloth or rubber, large enough and of suitable shape to enclose the udder, coming up to the body, flaring at the top and held up by a strap over the back. This should be filled with soft, warm water, 65° being a good temperature, to be changed occasionally when it becomes very warm. This will allay irritation, and reduce the inflammation and swelling.

Digestion first fails in this disease when the secondary or low stage of the fever comes on. The food remains in the stomach undigested, where it ferments, generating a gas which inflates the stomach and intestines. This state greatly affects the nervous system, and the hind extremities indicate weakness by staggering on attempting to rise, and failing to do so. The hind limbs sometimes under such circumstances become temporarily palsied. At this stage the pulse is the only sure guide. If it is weak, fluttering, and irregular, avoid giving anything of a purgative or weakening nature. The indications of the pulse of cattle have already been previously given, and therefore do not require repetition in this connection.

After the operation of the purgative, little will generally be required except good nursing. The animal should have a warm, comfortable stable, with a thick bedding of straw or

leaves. The stable should be kept clean and well ventilated, and it may also be well to cover the sick animal with a blanket to keep her warm. Warm gruel should be given her frequently, and light mashes. Attempts should frequently be made during the day to draw milk from the teats; the sooner this can be accomplished, the better. The return of the milk to the udder is one of the surest indications of a speedy recovery. One attack of this disease predisposes an animal to another: care should therefore be exercised to obviate the cause as far as possible.

**Rabies, or Hydrophobia.**—This is a disease known to originate in the genus *Canis*, such as the dog, fox, and wolf, and also in cats. It seems to be caused primarily by a blood poisoning, and not a disease of the nervous system, as was formerly supposed, and may be communicated to all animals and man by the bite of an animal thus affected, the virus being in the saliva and blood. This disease was known to the ancients, and is mentioned in the writings of Aristotle, Pliny, and Horace. Almost all animals that are bitten by a rabid dog are attacked with the disease sooner or later, while only a comparatively small percentage of men that are bitten by rabid animals are ever affected by it. A horse that is bitten by a rabid animal will generally be attacked in from twelve to ninety days—usually thirty days; cattle from twenty to thirty days, and frequently from ten to fourteen days; sheep from fifteen to seventy days; swine from twenty to forty-nine days. In mankind the period of incubation varies from a few days to months, and even years, it frequently being brought on by nervous anxiety, dread, and mental excitement respecting it. The first symptoms of the rabies in the dog, are a loss of appetite, sullenness of disposition, and restlessness; he will at times stand perfectly quiet with a vacant gaze forward, seems eager for water, but can swallow it only with great difficulty; sometimes the sight of water will throw him into convulsions; he bites at everything that comes in his way, even his chains and the boards in his kennel. The lower jaw sometimes becomes pendulous, froth issuing from the mouth; he continues to grow worse and generally dies on the fifth or sixth day.

Cattle attacked with this disease have similar indications; they are restless at first, refuse food, have considerable fever, delirium setting in early. Their destructive propensity is shown by striking and hooking with the horns, biting the manger, etc: the animal paws and bellows, has an evident desire for water, but cannot swallow it, continues to grow worse, death finally taking place in convulsions, or by paralysis. There is no known remedy for this disease, and even if there were, it would be dangerous to attempt treatment. All that can be done is to place the animal suspected of having this disease by himself, and confined in such a manner as to be powerless to do harm, and wait for the development of more positive symptoms. As soon as these are satisfactorily indicated, the sooner the poor animal is killed and thus relieved of its suffering, the better.

### Red Water. (See HAEMATURIA.)

**Rinderpest.**—This terrible disease, known also as the "cattle plague," originated in Asia, and was carried into Europe as early as the fourth century. An extensive outbreak of this disease occurred in 1709; it is estimated by reliable authorities that not less than two hundred millions of cattle were destroyed in Europe during the eighteenth century by this disease alone. Of the causes that tend to develop the cattle plague, nothing definite is known, the principle of contagion not yet being fully understood, but when once an animal is infected with this deadly disease, it extends to every tissue and secretion of the body. Healthy animals will become infected by even coming near infected animals without contact with them, or near anything contaminated by their secretions or exhalations. Any object therefore may become infected, such as clothing, hay, straw, woodwork, etc., and carry the disease for a long time. Even dogs and cats have been known to have carried the disease in their fur, and birds in their plumage. It is also known that a small quantity of blood, or

excrement from infected animals on the sole of a shoe, or end of a cane, has sometimes been sufficient to carry the disease to a great distance.

An important authority says, in this connection: "All who have investigated the subject of rinderpest have been struck with the important place held by excrement in its propagation. As the disease concentrates its morbid action on the stomach and bowels, their products are especially charged with the poison; and if brought in contact with other animals in their fresh condition, or after having been closely packed in a mass, they will communicate the disease with the greatest certainty. Hence the history of the malady is full of instances of infection from recently manured fields, from those on which the manure has been spread but frozen for weeks and months, from grazing on fields formerly occupied by diseased animals, and from occupying buildings, yards, loading banks, wagons, cars, ships, and boats in which the sick have been. The manure is usually deposited in masses, thick enough to prevent the ready destruction of the virus by the action of the air, and hence its virulence is only extinguished by the slow process of putrefaction. Whatever, therefore, retards this process, will prolong this danger; and thus the frosts of winter, and the firm packing of the manure, will each favor the retention of the contagion."

When the carcasses of animals infected with this disease are left accessible to dogs and other animals, the meat or bones are liable often to be carried by them to be eaten into the very yards or buildings where cattle and sheep are kept. The importance of preventing the spread of this contagion by deeply burying such carcasses as soon as possible, will readily be seen. All ruminating animals are liable to rinderpest, but cattle are more liable to it than sheep, goats, and deer. The development of this disease is sometimes so rapid that death occurs after the second day, but usually from five to six days after the disease makes its appearance.

From the time of infection, this disease usually makes its appearance somewhere from the fourth to the ninth day, and generally on the fifth or sixth from the date of exposure. The period of incubation has in some exceptional cases been known to be protracted to two, or even three weeks, but the general rule is as above stated.

The first symptom of the cattle plague is a very perceptible increase in the temperature of the body, which may be readily detected by a thermometer introduced into the rectum. This occurs from twenty-four to forty-eight hours before any other change is noticeable in the infected animal. The temperature of the body will rise to 105° or 106° F., accompanied with other fever symptoms, such as shivering, dryness of the skin, twitching of the muscles, a staring coat of hair, restlessness, colicky pains, unequal distribution of temperature throughout the body, with sudden changes of temperature, particularly noticeable at the base of the horns.

At first, the bowels will generally be constipated, which conditions will be succeeded by violent purging; the dry and hot condition of the eyes and mucus membrane lining the nose and mouth in the early stages is followed by a watery discharge, which soon takes a turbid form resembling pus. The urine is scanty and dark colored, and the pulse very rapid. The mucus membrane throughout the body undergoes a peculiar change that is especially noticeable in the vagina of cows, and may also be seen in the mouth and nose of all animals infected, which in the early stages become spotted or striped with red, such spots showing great inflammation. About twenty-four hours after the red spots make their appearance, yellowish white or gray specks may be seen on the red ones. These specks may be easily rubbed off by the finger, being formed by the loosening of the cuticle. When thus rubbed off a dark red depression remains. As the disease progresses the body gets cold, and the animal finally becomes unconscious and dies.

In some cases small tumors and eruptions are seen about the neck, dewlap, or flank.

The sub-cutaneous cellular tissue frequently becomes filled with gas, giving the body a bloated appearance.

Many of the symptoms of rinderpest are seen in the pleuro-pneumonia, or lung disease, also in the malignant catarrhal fever, and in the mouth and foot disease. It is found by a careful estimate that about seventy-five per cent. of animals infected with this disease die, and those that survive do not have it in its most malignant form. The disease is less severe in summer when cattle are grazing than in winter, when kept in close stables and fed on dry fodder.

There is no known remedy for this disease; hence, in dealing with it, the only security is in prevention, and in extinction. Most European governments have passed stringent laws for protecting their respective countries from the invasion of this disease, and for its extinction when it occurs. In this respect the laws enacted by the German Empire may be regarded as the most complete and effectual, being based upon the results of experience and scientific investigation.

The only safety is in promptly killing and deeply burying all infected animals, and in isolating from all others of the herd all such as are suspected of having it. An animal once recovering from this disease never has a subsequent attack.

**Ringworm.**—This is a parasite, which may be transferred from one animal to the others of the herd, and is quite common. It is known by bald patches on the skin, covered with white scales and scabs, showing some eruption.

The parts should be washed with soap and warm water to remove the scabs, and when dry anoint with lard and sulphur, as recommended for mange in horses.

**Sprains.**—The best treatment for strains and sprains in cattle is identical with that recommended for the same in horses (which see).

**Sterility.**—Barrenness in cows may often be overcome by reducing them in flesh, such cows almost always being in high condition. When an excess of fat seems to be the cause of the difficulty, reducing the food, or keeping on short pastures for a few weeks previous to service, will frequently overcome the difficulty. It may also be well in the same connection to give a small dose of Epsom salts occasionally.

Giving hemp seed each day for two or three weeks previous to and after service, also flax-seed tea, will in some cases have a very favorable effect. If the cow is quite thin in flesh, improve her condition a little by better feed. A careful examination will sometimes determine the nature of the difficulty. For this purpose the hand and arm should be well smeared with sweet oil or fresh lard, and carefully introduced along the vagina with a rotary movement, to prevent injury, until the *os uteri*, or mouth of the womb, is reached. It can then be determined, by careful examination of the parts, whether or not this is impervious.

If there is a gummy substance, or any other mechanical obstruction, it must be broken through or cut. The latter would probably require the assistance of a good veterinary surgeon. Sometimes the opening can be effected by dilating it with the fingers, by using a gentle, rotary motion. This treatment should be followed by smearing the parts with two drachms of solid extract of belladonna. Repeat this treatment the following day, using one-half the quantity of belladonna, and permit service four or five hours afterwards.

A tea of red oak bark injected into the vagina daily until the period of œstrum, then omitted for a day or two, and allowing service, will sometimes prove effectual. In making flax seed tea, use a half pound of whole flax seed (not meal) to a gallon of water, and steep for several hours, giving from one-half to a pound daily.

**Stricture or Obstructions in Cows' Teats.**—The flow of milk from the teats may be impeded by a variety of causes, the obstructions sometimes being but partial, at others complete. Obstruction is frequently due to the presence of milk stones within the

canal of the teat, stricture, tumors attached to the lining of the teat, or the formation of a false membrane. Great care should be used in the treatment, as irritation may be the result, which will cause inflammation and possible loss of that quarter of the udder. Any obstruction like milk stones may be frequently pushed up through the canal of the teat into the milk chamber, where they may remain without harm. For this purpose, a silver probe or knitting needle may be used, first smearing it with sweet oil. It should be inserted with caution to prevent irritation, great care being used not to insert it any farther than the extent of the teat, to avoid injury to the milk gland. The probe should be inserted two or three times a day, always first oiling it, and gradually increasing the size of the probes used until the stricture is removed.

In case of the formation of a false membrane, a double-edged probe may sometimes be used with benefit, and an elastic rubber bougie inserted, leaving an inch or so in length protruding outside the teat, to render its removal easy at milking time. Its insertion will not be required for more than a week or ten days, or until the cut membrane is entirely healed.

**Tetanus or Lockjaw.**—This disease usually arises from some injury, such as a nail puncture or other wound to the foot. It may also be caused by improper food and exposure to cold. It not unfrequently follows castration. The early symptoms of this disease are a loss of appetite and a disinclination to move. The whole body becomes sooner or later affected, the muscles rigid, breathing short, pulse quick and wiry, bowels constipated, urination scanty or checked altogether. The animal stands with the hind legs wide apart, nose extended, head and tail elevated, and the back in an unnatural position, sometimes arched and sometimes depressed. But little can be done for this disease, especially when beyond the first stages, other than to give quieting medicine and open the bowels; also relieve the bladder as soon as possible. Keep the animal quiet and in a darkened, comfortable stable, always avoiding a strong light.

Bathing in warm water and rubbing in a good supply of tincture of arnica soon after the injury is received, will have a tendency to ward off the disease when the foot is injured by a puncture or otherwise. All nervous excitement should be avoided.

**Texas Fever.**—This disease is also commonly known as Spanish fever, splenic fever, etc. It originated in the low lands of Mexico and Texas, and has been extended to other localities through the introduction of Texas cattle, it being communicated from one herd to another by infected animals being driven over the road, or pastured on lands frequented by other cattle. During the spring and summer, for many years there has been a large shipment of these wild, roving cattle to the Northern States, some being used for beef at once, while others are turned out to pasture for the season, in order to be in better condition for the market in the fall.

By this means the native stock in these localities has become infected with this disease, which has extended to others, until it has become of no uncommon occurrence in the Western and Middle States, some cases of it having been known even in New England. This malignant disease often makes its appearance very suddenly, rarely however breaking out before the middle of August, and continuing until cold weather. It never occurs spontaneously in regions visited by frost, and when carried to this region in summer, will die out soon after frost comes. Texas cattle wintered at the North will not communicate it the following summer. Several of the Western States suffered such heavy loss from this disease by the importation of Texas cattle and their transportation through them, that legislative measures were adopted a few years since to prevent such cattle from being brought in, and which resulted very successfully, the disease at present being much less common than formerly.

The period of incubation has not been definitely determined by experiment, but it is supposed that from ten to forty days may elapse after the animal has been exposed, before

the first symptoms of the disease may appear. There seems to be a great difference in animals with respect to their susceptibility to this disease, while the temperature and time of the year have much to do with its early progress. It has been found that it is most virulent and fatal in warm, sultry weather, and most inactive in cold, wet seasons.

**Symptoms.**—The symptoms, etc., of this disease are given as follows, by an authoritative writer having considerable experience with it:

“The manner in which this affection appears is quite variable, owing to the age and general condition of the animal. In cows, the diminution of milk is one of the first symptoms. The ears droop, the gait is sluggish and tottering, with a disinclination to move. The animal will stand in one position, with head depressed, when more or less trembling will be seen about the flanks. In a few days, the patient looks thin and hollow. The abdominal walls will appear shrunken, and the back will be arched, as though suffering from distress or internal pains.

The skin is usually dry and hot, especially about the head, and rarely moistened on any part of the body with perspiration. The bowels are costive, but not unfrequently a fetid diarrhoea will supervene in the last stages. The urine is invariably scanty, high-colored, and even bloody. In fatal cases, the bladder becomes distended, its wall paralyzed, and all power of micturition lost before death.

The diagnosis of this malady, therefore, is not difficult, especially with the aid of a thermometer, to determine the degree of fever heat. The elevation of temperature indicates the severity of an attack, and will be found to vary from 101 degrees, the normal standard in cattle, to 107, in fatal cases. The “ticks” are an important aid in doubtful cases. Their presence serves as a *label*, to tell us either from whence the animal came, or the exposure it has encountered. Consequently, when we find a sick creature that is covered with ticks, and shows a high fever heat on thermometer, we can be almost sure, even at an early stage, that it is a case of the Texas plague. But this will soon be corroborated by a high-colored urine, which, on account of the congested condition of the kidneys, is a characteristic symptom; and, in fact, we have never seen an animal sick with this complaint that was not affected with haematuria.

**Post-Mortem Appearances, etc.**—The morbid aspect of the internal organs, after death, is so marked, that we are enabled to decide a doubtful case at once. The spleen, or milt, is always found much enlarged. It is often increased to five times its normal weight. This organ is so completely engorged with blood, that chemical changes set in before death. The tissues will, accordingly, appear soft, and not unfrequently the viscus is found ruptured. We have examined several cases where the spleen was more than two feet long, eight inches wide, and three in thickness, and weighed ten pounds. Such an organ cannot easily be overlooked.

The liver has a softened and waxy appearance. It is very yellow in color, but with an occasional tinge of greenish black. This organ is usually much congested and enlarged, weighing from twenty to thirty pounds. The gall-bladder is surcharged with dark, viscid, and flocculent bile, the granular nature of which is brilliantly shown by transmitted light.

The kidneys, as before observed, are congested, swollen, and softened. They are often so much enlarged as to appear disturbed in form, as though they were twisted. On section, the tissues are dark, and unnatural in appearance. Hence the bloody urine, scanty though it be, that must escape from such an impaired organ, and which at once becomes of vital importance in the animal economy.

In ordinary cases, the heart and lungs show no signs of disease. But there is more or less inflammation of and erosion about the stomach, especially in the fourth apartment, known as the *abomasum*. This, with the upper portion of the bowel, is congested and

partially softened, the effects of which changes are often seen in healthy Texas cattle when slaughtered in Northern markets.

The blood also undergoes important changes. The red corpuscles are perceptibly modified in form and size, as well as wonderfully diminished in quantity, in the last stages. Hence the reason for the diffusion of the coloring matter all over the body before death. Bile can always be detected in the blood of one of these sick animals, and thus acts as a solvent on the anatomical elements. Cholaemia, therefore, exists, as shown in all the exudations beneath the skin, and in all the internal organs.

With the condition of the system as seen from a *post mortem* examination, treatment can avail but little. Various plans of medication have been resorted to, but thus far with questionable results. No specific medicines have yet been found to stay its ravages. Eliminatives and antiseptics would naturally seem to be called for, and have been given in certain cases with good results. But it is impossible to select even an approximate remedy until the pathology of this contagious malady is better understood; and this can only be accomplished by experimental investigation, which should ever be the theme of a National Sanitary Commission, appointed by the President."

**Tuberculosis.**—This disease, which is identical with consumption in the human family, is more common in cattle than any other of the domestic animals. It is also found more frequently in cows than in oxen, those cows that have been kept in dairies a long time being particularly predisposed to it. It would seem from this fact that the drain upon the system by continuous milk production might be regarded as a predisposing cause. Dark, under-ground stables, poor ventilation, cold, damp sheds; insufficient food, or food of poor quality; all tend to the development of this disease. Tuberculosis is also hereditary in all grades and classes of cattle, but particularly so in these which are in-and-in bred. In fact, we believe there is no one cause more potent in the production of this disease than the common, yet pernicious system of in-and-in breeding.

Calves but from two to three months old have been known to die from this disease, a *post-mortem* examination showing the lungs and pleura filled with tubercular tumors. This is only one of many proofs of its hereditary character. In-and-in breeding cannot be followed long without a deterioration in the constitutional vigor and hardiness of the stock thus bred, and breeders would do well to give more consideration to this subject and thus avoid the evils resulting from it.

This disease is also contagious, as has been proved by various experiments on animals. When sound animals are placed in the same stable with diseased ones, so as to eat from the same manger or inhale the air expired from their lungs, infection will follow as a natural result. Hay that has been breathed upon by a diseased animal becomes contaminated, and infection will take place by this means through the digestive organs. Stalls that have been occupied by infected animals will also be the cause of this disease, providing they are occupied by others before being properly cleansed.

Dr. Villemin of the Val-de-Grace Hospital, Paris, made numerous experiments on animals a few years since, with a view of testing the question whether human consumption might not be caused by the introduction of a specific virus into the system. He inoculated rabbits and guinea pigs in various parts of the body, with matter taken from a diseased human lung, which resulted in many of them dying, while others lingered in a suffering condition until killed, and in every case tubercular deposits were found, thus proving that the disease had been transmitted by inoculation. He also inoculated rabbits with matter from the diseased lung of a cow, with the same result as before, and thus demonstrated that tuberculosis, or bovine consumption, is identical with consumption in man.

Prof. Chauveau, of Lyons, found in his experiments that this disease can be as readily transmitted through the digestive organs as by any other means. He gave to three calves

an ounce of a diseased lung taken from a cow. In two weeks one of the calves began to fail very perceptibly. In about three weeks from giving the first dose he gave another of the same quantity, and all the symptoms of the disease were soon manifested. They became rapidly emaciated, with occasional fits of hard coughing. In about eight weeks the calves were killed, the post-mortem examination showing a diseased condition of the lungs, bronchial glands, and system generally that is characteristic of tuberculosis. These experiments are sufficient to demonstrate conclusively that tubercular consumption can be transmitted from one animal to another, and from them to man in many ways, and especially by the eating of diseased meat. The flesh of animals infected with this disease is not only unfit for food, the blood being poisoned with virus, but is absolutely dangerous as a medium of communicating the disease.

The earliest symptoms of this disease are generally an unthrifty condition, the animal becoming thin, with a failing or capricious appetite. If a cow, the milk becomes thin and watery, although not much diminished in quantity; the coat looks dull and rough, and the animal has a dry, hard cough. The breathing will be short, the lungs showing tenderness and soreness when pressed upon. The blood gets thin and watery, and frequently a diarrhœa will set in, with a fatal termination after a few days. Judicious treatment in the early stages may possibly result in a cure, but is of no avail when the disease becomes established.

Apply mustard paste to the chest sufficient to cause counter irritation, and feed liberally oleaginous food that is easy of digestion, such as oil cake, together with bran mashes, etc. Give also cod liver oil to the amount of half a pint per day, mixed with the same quantity of whisky. Avoid all foods difficult of digestion, and give good care and nursing.

#### **Tympanitis.**—(See Hoven.)

**Venomous Bites.**—All cattle, when grazing in the summer season, are liable to be bitten by poisonous reptiles or insects, and stung by hornets, wasps, or bees. It not unfrequently happens that in the Western and Southern sections an animal will be badly poisoned from the bite of a rattlesnake, tarantula, or some other equally venomous reptile.

The bites or stings are usually about the head; the tongue or nose not unfrequently being the point of attack.

For either bites or stings we know of nothing more effectual than the spirits of ammonia or hartshorn, and this should be applied freely to the injured part as soon as possible; a cloth or sponge saturated with the liquid being the most convenient thing for the purpose. If used immediately after the injury, the effect will be almost instantaneous. If no ammonia is at hand, common baking soda or saleratus may be dissolved with water and applied as above, followed afterwards by an application of linseed or sweet oil. Three parts of spirits of ammonia to one of oil is also a good remedy. Good effect may also be derived by thoroughly moistening ground chewing tobacco with water and binding it upon the wound. In mild cases an onion, bruised sufficient to extract the juice readily, and bound upon the injured part is also a good remedy.

To protect against gad flies, wash the flanks and other parts most commonly attacked by a strong infusion of the green bark of the common elder, or of tobacco, the same as for killing lice. To protect against buffalo gnats, that are so troublesome in some localities, smear the parts most liable to attack with a mixture of tar and lard, in the proportion of one part tar to two parts lard. Equal parts of tar and petroleum are also excellent.

For the bite of a rattlesnake, or other poisonous snake, apply immediately strong spirits of ammonia, and keep the wound and adjacent parts constantly wet with it for hours by means of a sponge. Give also as quickly as possible the following: one pint of whisky, one tablespoonful of spirits of ammonia, one-half pint of water. Thoroughly mix and give at once. It may be necessary to repeat one-half of this dose for two or three hours until the

animal is relieved. It may be well to cauterize the wound with a hot iron or creosote before applying the ammonia.

Tarantula bites, stings of centipedes, scorpions, etc., should be treated the same as snake bites, except cauterizing.

**Warbles.**—(See GRUB.)

**Warts.**—Small warts may be closely removed with scissors; large ones having a small neck may be strangled by tying a strong waxed silk thread around the base as low as possible. If the wart does not drop off in the course of a week, another ligature should be applied in the same manner. Whichever method is resorted to for their removal, cauterize the place after their removal with lunar caustic, or touch them daily with some tincture of iron. If the warts are flat, and hence cannot be ligatured, apply once or twice a day nitric acid, until they disappear. When they are well burned down, apply twice a day sweet oil or fresh cream simmered to an oil.

**Wens.**—In the early stages, when first started and soft, bathe in warm water and apply warm poultices until the soreness is partially removed; then paint them with tincture of iodine once a day. If they become hard and large, they will have to be taken out. Dress the wound two or three times a day, washing it with a carbolic lotion of one-half ounce of carbolic acid to one pint of water. It would be a good plan to bind on the wound a sponge wet with the lotion.

**Wounds.**—Wounds on the body may be sewed up or drawn together by means of cloth so cut as to alternate in strips and overlap, to which some kind of adhesive plaster should be applied to hold them in place, drawing them carefully together so as to close the wound before pressing the overlapping ends upon the surface. Before drawing the wound together, the hairs on the edges should be all clipped off; be careful to have everything clean, and permit no foreign substance of any kind get into it. When sewed, the wound should be drawn together with a needle slightly curved; silk is generally preferred for this purpose.

In drawing the silk through, tie a knot, using the end of the silk, and that drawn through the edges, in such a manner as to prevent its untying or drawing out. The stitches should generally be about half an inch apart. When the wound has grown together, cut the silk and pull it out, each stitch separately. Wounds on the legs may be best drawn together by the use of bandages. The bandage slit into three or four strips at both ends is very convenient for drawing such wounds together. Keep the bandages clean by washing them once or twice a day, and bathe the wound three or four times a day in a carbolic lotion of one-half ounce carbolic acid mixed with one pint of soft water. When the wound is nearly closed, apply three times a day a mixture of one part carbolic acid, and eight parts of olive oil.

## LIST OF MEDICINES,

## WITH QUANTITY SUITED TO DIFFERENT ANIMALS.

The following list of medicines with the quantity suited to different farm animals is given by Dr. Law in his Veterinary Adviser, and may be found convenient for ready reference. Those marked by a star (\*). will be found very useful to have always ready at hand. All medicines should be kept *well corked*, and all corrosive substances in strong glass bottles, with ground glass stoppers.

Acetic Acid, antidote to alkalies, cooling astringent: Horse 1 drachm; ox 2 drachms; ass 1 drachm; sheep 1 scruple; dog 2 to 3 drops.

Tincture of Aconite, sedative, diaphoretic: Horse 20 to 30 drops; ox 30 to 40 drops; ass 15 to 20 drops; sheep 3 to 5 drops; dog 1 to 3 drops.

Alcohol, stimulant, diuretic, narcotic: Horse 1 to 3 ounces; ox 3 to 6 ounces; ass 1 ounce; sheep  $\frac{1}{2}$  ounce; dog 2 drachms. Cooling astringent.

Brandy, Whisky, and Gin, stimulant, diuretic, narcotic: Horse 3 to 6 ounces; ox 6 to 12 ounces; ass 2 to 5 ounces; sheep 10 ounces; dog  $\frac{1}{2}$  ounce. Locally cooling astringent.

Strong Ale, stimulant, diuretic, narcotic: Horse 1 to 2 pints; ox 2 to 4 pints; ass 1 pint; sheep  $\frac{1}{2}$  pint; dog 2 ounces. Locally cooling astringent.

Barbadoes Aloes, purgative: Horse 4 drachms; ass 3 to 4 drachms; dog  $\frac{1}{2}$  drachm.

Cape Aloes, purgative: Horse 5 drachms; ass 4 to 5 drachms.

Alum, astringent: Horse 2 to 3 drachms; ox 3 to 4 drachms; ass 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog  $\frac{1}{2}$  to 1 scruple.

Ammonia, Liquid, diffusible stimulant, antispasmodic, antacid, diuretic: Horse  $\frac{1}{2}$  ounce; ox  $\frac{1}{2}$  to 1 ounce; ass 2 to 4 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog 10 drops. Locally blister.

Aromatic Ammonia, diffusible stimulant, antispasmodic, antacid, diuretic: Horse 1 to 2 ounces; ox 2 to 4 ounces; ass 1 to 2 ounces; sheep  $\frac{1}{2}$  to 1 ounce; dog 1 drachm. Locally blister.

\* Carbonate of Ammonia, diffusible stimulant, antispasmodic, antacid, diuretic: Horse 2 to 4 drachms; ox 4 to 6 drachms; ass 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog 10 to 15 grains. Locally blister.

Muriate of Ammonia, stimulant, discentient, alterative, diuretic: Horse 2 to 4 drachms; ox 4 to 6 drachms; ass 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog 20 grains. Locally cooling discentient.

Acetate Ammonia, Solution, diaphoretic, diuretic, stimulant: Horse 2 to 3 ounces; ox 3 to 4 ounces; ass 2 ounces; sheep  $\frac{1}{2}$  to 1 ounce; dog 2 drachms.

Anise-seed, stomachic, carminative: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 to 4 drachms; dog 1 to 3 scruples.

Antimony, Tartarized (Tartar Emetic), emetic; Swine 5 grains; dog 2 to 4 grains. Sedative, diaphoretic: Horse 2 drachms; ox 2 to 4 drachms; ass 2 drachms; sheep 1 to 2 scruples; swine  $\frac{1}{2}$  to 1 grain; dog  $\frac{1}{2}$  to  $\frac{1}{2}$  grain. Locally blister.

Areca Nut, vermifuge, taniafuge: Horse 1 ounce; ox 1 ounce; ass 1 ounce; sheep 3 drachms; dog  $\frac{1}{2}$  to 1 drachm.

\* Arnica, Tincture, stimulant, diuretic: Horse 1 drachm; ox 1 drachm; ass  $\frac{1}{2}$  drachm; sheep 1 scruple; dog 10 drops. Locally cooling, soothing.

Arsenic, alterative, nerve tonic: Horse 5 grains; ox 5 to 8 grains; ass 3 to 5 grains; sheep 1 grain; swine  $\frac{1}{2}$  grain; dog 1-12 grain. Locally caustic, parasiticide.

\* Assafoetida, diffusible stimulant, carminative, vermifuge and appetizer: Horse 2 drachms; ox 4 drachms; ass 1 to 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; swine  $\frac{1}{2}$  drachm; dog 10 to 20 grains.

Azedarach, vermifuge: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 ounce; ass 3 to 4 drachms; sheep 1 to 2 drachms; swine 1 drachm; dog 20 grains.

Belladonna, anodyne, antispasmodic, narcotic: Horse 2 ounces; ox 2 ounces; ass 1 to 2 ounces; sheep  $\frac{1}{2}$  ounce; dog 5 grains.

Belladonna, Extract, anodyne, etc.: Horse 2 drachms; ox 2 to 3 drachms; ass 1 to 2 drachms; sheep  $\frac{1}{2}$  drachm; dog 1 to 3 grains.

Atropia (alkaloid) of Belladonna, anodyne, etc.: Horse 1 to 2 grains; ox 1 to 2 grains; ass 1 grain; sheep  $\frac{1}{2}$  grain; dog 1-16 grain.

Balsam of Peru, stimulant, antispasmodic, expectorant: Horse 1 ounce; ox 1 to 1 $\frac{1}{2}$  ounces; ass  $\frac{1}{2}$  to 1 ounce; sheep 2 drachms; dog  $\frac{1}{2}$  drachm.

Benzoin, stimulant, antispasmodic, expectorant: Horse 1 ounce; ox 1 to 1 $\frac{1}{2}$  ounces; ass  $\frac{1}{2}$  to 1 ounce; sheep 2 drachms; dog  $\frac{1}{2}$  drachm.

Borax, nerve sedative, uterine stimulant: Horse 2 to 6 drachms; ox  $\frac{1}{2}$  to 1 ounce; ass 2 to 4 drachms; sheep  $\frac{1}{2}$  to 1 drachm; swine  $\frac{1}{2}$  drachm; dog 5 to 10 grains. Locally astringent, parasiticide.

Bismuth, Subnitrate, soothes irritation of the stomach and bowels: Horse 2 drachms; ox 2 to 4 drachms; ass 1 to 2 drachms; sheep 20 grains; swine 10 to 20 grains; dog 5 to 10 grains. Locally soothing, healing.

Blackberry Root, astringent; Horse 2 to 4 drachms; ox  $\frac{1}{2}$  ounce; ass 2 drachms; sheep 2 scruples; dog  $\frac{1}{2}$  scruple.

Blue-stone (Copper Sulphate).

Boneset, stimulant, tonic, diaphoretic: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 ounce; ass  $\frac{1}{2}$  ounce; sheep 2 to 3 drachms; swine 2 drachms; dog  $\frac{1}{2}$  to 1 drachm.

Bromide Potassium, nerve sedative: Horse 2 to 4 drachms; ox 4 drachms; ass 2 to 3 drachms; sheep  $\frac{1}{2}$  drachm; dog 5 to 10 grains.

Buchu, stimulant, diuretic: Horse 4 drachms; ox  $\frac{1}{2}$  to 1 drachm; ass 3 drachms; sheep 1 drachm; dog 10 to 20 grains.

Buckthorn Syrup, purgative: dog  $\frac{1}{2}$  to 1 ounce.

Calomel, purgative: Horse 1 drachm; ox 1 to 2 drachms; ass 1 drachm; swine 1 scruple; dog 3 to 4 grains. Alternative: Horse 1 scruple; ox 1 to 3 scruples; ass 1 scruple; swine 3 to 4 grains; dog  $\frac{1}{2}$  to 1 grain.

Camphor, calmative, antispasmodic: Horse 1 to 2 drachms; ox 2 to 4 drachms; ass 1 drachm; sheep 1 scruple; dog 3 to 10 grains.

Cantharides, stimulant, diuretic; Horse 5 grains; ox 5 to 10 grains; ass 3 to 5 grains; sheep 1 to 2 grains; dog  $\frac{1}{2}$  to  $\frac{1}{2}$  grain. Locally blister.

Capsicum, Cayenne Pepper, stimulant, aromatic: Horse 2 to 3 drachms; ox 2 to 4 drachms; ass 1 to 2 drachms; sheep 1 scruple; swine  $\frac{1}{2}$  to 1 scruple; dog 2 to 5 grains. Locally irritant.

Caraway Seed, stomachic: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 to 3 drachms; swine 2 drachms; dog 1 scruple.

Cardamoms, stomachic: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 to 3 drachms; swine 2 drachms; dog 1 scruple.

Cascarilla, stimulant, bitter tonic: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 ounce; ass 4 to 6 drachms; sheep 1 drachm; dog 10 grains.

Carbolic Acid, sedative, anodyne, astringent, antiseptic, disinfectant: Horse  $\frac{1}{2}$  to 1 drachm; ox 1 drachm; ass  $\frac{1}{2}$  drachm; sheep 10 drops; dog 5 drops.

Castor-oil, purgative: Horse 1 pint; ox 1 to 1 $\frac{1}{2}$  pints; ass 1 pint; sheep 3 to 4 ounces; dog  $\frac{1}{2}$  to 1 ounce.

Catechu, astringent: Horse 2 to 5 drachms; ox 3 to 8 drachms; ass 2 to 3 drachms; sheep 1 to 2 drachms; dog 10 to 30 grains.

Chamomile, stimulant, tonic: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 drachms; dog  $\frac{1}{2}$  drachm.

Cherry Bark, wild, expectorant: Horse  $\frac{1}{2}$  ounce; sheep 2 to 3 scruples; swine 2 scruples; dog 1 scruple.

Chloral-Hydrate, sedative, antispasmodic: Horse  $\frac{1}{2}$  ounce; ass  $\frac{1}{2}$  to  $\frac{1}{2}$  ounce; sheep 1 drachm; dog 20 grains. Soporific: Horse 1 ounce; sheep 2 to 3 drachms; dog  $\frac{1}{2}$  drachm.

Chloroform, sedative, antispasmodic, stimulant: Horse 1 to 2 drachms; ass 1 drachm; sheep 1 scruple; dog 5 to 10 drops. Anæsthetic.

Cinchona, Peruvian Bark, bitter tonic, antiseptic, antiperiödic: Horse 1 to 3 ounces; ass 1 ounce; sheep 2 to 4 drachms; dog 1 drachm.

Cinnamon, stomachic; Horse 4 to 6 drachms; ox  $\frac{1}{2}$  to 1 ounce; ass 4 to 6 drachms; sheep 1 to 2 drachms; dog 10 to 20 grains.

Cod-liver Oil, tonic: Horse 4 to 6 ounces; ox 6 to 8 ounces; ass 4 to 6 ounces; sheep 1 to 2 ounces; dog  $\frac{1}{2}$  ounce.

Colchicum, diuretic, sedative: Horse  $\frac{1}{2}$  to 1 drachm; ox 1 to 2 drachms; ass  $\frac{1}{2}$  drachm; sheep  $\frac{1}{2}$  scruple; dog 2 to 8 grains.

Colocynth, bitter purgative: Dog 2 to 5 grains.

Columbo, bitter tonic: Horse 4 to 6 drachms; ox  $\frac{1}{2}$  to 1 ounce; ass 2 to 3 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog 10 grains.

Conium, Extract, sedative: Horse 1 drachm; ox 1 to 2 drachms; ass  $\frac{1}{2}$  to 1 drachm; sheep 10 to 15 grains; swine 10 grains; dog 2 to 5 grains.

Copaiva, stimulant, diuretic, expectorant: Horse 2 to 4 drachms; ox 3 to 4 drachms; ass 2 to 3 drachms; sheep  $\frac{1}{2}$  to 1 drachm; dog 10 drops.

Potassium Bromide, nerve sedative: Horse  $\frac{1}{2}$  ounce; ass 2 to 4 drachms; sheep 2 drachms; swine 1 drachm; dog 20 grains.

Potassium Cyanide, sedative, antispasmodic: Horse 1 to 2 grains; ox 2 grains; ass 1 to 2 grains; sheep  $\frac{1}{2}$  grain; dog  $\frac{1}{2}$  to  $\frac{1}{4}$  grain.

Prussic Acid, sedative, antispasmodic: Horse 20 to 30 drops; ox 30 to 40 drops; ass 15 to 20 drops; sheep 5 to 8 drops; swine 5 drops; dog 1 to 3 drops.

Pumpkin Seeds, vermifuge, tœniæfuge; Dog  $\frac{1}{2}$  ounce.

Quina, Sulphate, bitter tonic: Horse 20 grains; ox 20 to 30 grains; ass 15 to 20 grains; sheep 6 to 10 grains; swine 5 to 10 grains; dog 2 to 6 grains.

Rhubarb, laxative, tonic: Horse 1 ounce; ox 2 ounces; ass 1 ounce; sheep 1 drachm; dog 20 grains.

Resin, diuretic: Horse 4 to 6 drachms; ox  $\frac{1}{2}$  to 1 ounce; ass 4 to 6 drachms; sheep 2 to 4 drachms; swine 2 drachms; dog 20 to 30 grains.

Soap, diuretic, antacid, laxative: Horse 1 to 2 ounces; ass 1 ounce; sheep 2 to 6 drachms; swine 2 to 4 drachms; dog 20 to 60 grains.

Soda, Bicarbonate, antacid, diuretic: Horse 4 to 6 drachms; ox 4 to 8 drachms; ass 4 drachms; sheep 1 to 2 drachms; dog 5 to 30 grains.

Ergot, checks bleeding, parturient: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 ounce; ass  $\frac{1}{2}$  ounce; sheep 1 to 2 drachms; dog  $\frac{1}{2}$  drachm.

Ether, diffusible stimulant: Horse 1 to 2 ounces; ox 2 to 3 ounces; ass 1 ounce; sheep  $\frac{1}{2}$  ounce; swine 2 to 4 ounces; dog 1 drachm.

Fennel Seed, stomachic: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 to 4 drachms; dog  $\frac{1}{2}$  drachm.

Filix Mas., Extract, Male Shield-Fern, vermifuge, tœniacide: Horse 1 ounce; sheep  $\frac{1}{2}$  drachm; dog 10 to 20 drops.

Galls, Oak, astringent: Horse 4 to 6 drachms; ox 1 to 2 ounces; ass 4 drachms; sheep  $\frac{1}{2}$  to 1 scruple; swine 1 to 2 scruples; dog 1 to 3 grains.

Gallic and Tannic Acid, tanuin, astringent: Horse 1 to 3 scruples; ass 1 to 2 scruples; sheep 5 grains; dog 1 to 3 grains.

Gentian, bitter tonic: Horse 4 drachms; ox  $\frac{1}{2}$  to 1 ounce; ass 4 drachms; sheep 1 to 2 drachms; dog 10 to 20 grains.

Ginger, stimulant, stomachic: Horse 1 ounce; ox 2 ounces; ass  $\frac{1}{2}$  to 1 ounce; sheep  $\frac{1}{2}$  ounce; swine 2 drachms; dog 2 scruples.

Glauber Salts (Soda Sulphate).

Henbane, Hyoscyamus, Extract, sedative, antispasmodic: Horse 2 drachms; ox 2 to 4 drachms; ass 1 to 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; swine  $\frac{1}{2}$  drachm; dog 5 grains.

Hemp, Indian, Extract, antispasmodic, soporific, narcotic: Horse  $\frac{1}{2}$  to 1 drachm; ass  $\frac{1}{2}$  drachm; sheep 10 to 15 grains; swine 5 to 10 grains; dog 1 to 2 grains.

Hydrocyanic Acid (Prussic).

Iodine, alterative, discutient: Horse 10 to 20 grains; ox 20 to 30 grains; ass 10 grains; sheep 5 to 10 grains; swine 5 grains; dog 1 to 3 grains.

Iodide of Potassium, alterative, diuretic: Horse  $\frac{1}{2}$  to 1 drachm; ox 1 to 2 drachms; ass  $\frac{1}{2}$  drachm; sheep 3 scruples; swine 1 to 2 scruples; dog 1 scruple.

Ipecacuanha, emetic, sedative: Swine 1 to 2 drachms; dog 15 to 20 grains. Diaphoretic, expectorant: Swine  $\frac{1}{2}$  drachm; dog 3 to 5 grains.

Jalap, purgative: Swine 1 to 2 drachms; dog  $\frac{1}{2}$  to 1 drachm.

Iron, Peroxide, tonic: Horse 2 to 4 drachms; ox 4 drachms; ass 2 drachms; sheep 1 drachm; dog 5 to 10 grains. Antidote to arsenic.

Iron, Sulphate, tonic: Horse 2 to 4 drachms; ass 2 drachms; sheep 1 drachm; swine  $\frac{1}{2}$  drachm; dog 2 to 5 grains.

Iron, Carbonate, tonic: Horse 2 to 4 drachms; ass 2 drachms; sheep 1 drachm; swine  $\frac{1}{2}$  drachm; dog 2 to 5 grains.

Iron, Iodide, tonic, discutient: Horse  $\frac{1}{2}$  to 2 drachms; ox 1 to 2 drachms; ass  $\frac{1}{2}$  to 1 drachm; sheep 15 to 30 grains; swine 10 to 20 grains; dog 1 to 8 grains.

Iron, Tincture of Muriate, astringent, checks bleeding: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 to 2 ounces; ass  $\frac{1}{2}$  ounce; sheep  $\frac{1}{2}$  to 1 drachm; swine 10 to 30 drops; dog 5 to 16 drops.

Kino, astringent: Horse  $\frac{1}{2}$  ounce; ox  $\frac{1}{2}$  to 1 ounce; ass 2 to 4 drachms; sheep 1 to 2 drachms; swine  $\frac{1}{2}$  to 1 drachm; dog 10 grains.

Kousso, vermifuge: Sheep 2 to 3 ounces; dog 1 ounce.

Laudanum (Opium).

Copper, Ammoniated, tonic, antispasmodic, astringent: Horse 1 to 2 drachms; ox 1 to 2 drachms; ass 1 drachm; sheep 10 to 20 grains; dog 1 to 5 grains.

Copper, Iodide, tonic, discutient: Horse 1 to 2 drachms.

Copper, Sulphate, tonic, astringent: Horse  $\frac{1}{2}$  to 1 drachm; ox 1 to 2 drachms; ass  $\frac{1}{2}$  drachm; sheep 10 grains; dog 2 to 4 grains.

Croton Seeds, purgative: Horse 10 to 12; ox 15 to 20; ass 8 to 10; sheep 2 to 3; dog 1 to 2.

Croton Oil, purgative: Horse 15 to 20 drops; ox 20 to 30 drops; ass 12 to 18 drops; sheep 5 to 8 drops; dog 3 to 4 drops.

Cream of Tartar, diuretic: Horse 1 ounce; sheep 4 to 6 drachms; dog 1 drachm. Laxative: Horse 5 ounces; ox 5 to 8 ounces; ass 5 ounces; sheep 1 to 2 ounces; dog  $\frac{1}{2}$  ounce.

Dandelion Extract, Taraxacum, diuretic, laxative, bitter: Horse 1 to  $1\frac{1}{2}$  ounces; ox 2 ounces; ass 1 ounce; sheep 3 drachms; dog 1 drachm.

Digitalis, sedative, diuretic; Horse 15 to 20 grains; ox  $\frac{1}{2}$  to 1 drachm; ass 15 grains; sheep 5 to 15 grains; swine 2 to 10 grains; dog 1 to 3 grains.

Dover's Powder, sedative, diaphoretic; Horse 3 drachms; ox 3 to 4 drachms; ass 2 drachms; sheep 2 scruples; swine 1 scruple; dog 2 to 4 grains.

Mercury with Chalk, Hydrargyrum Cum Creta, antacid, laxative: Calf 10 to 15 grains; dog 5 to 10 grains.

Mercurial Pill, Blue Pill, laxative: Dog 5 grains.

Mercury, Subchloride (Calomel).

Muriatic Acid, Hydrochloric Acid, tonic, astringent, caustic, disinfectant: Horse 1 drachm; ox 2 drachms; ass 1 drachm; sheep 20 drops; dog 2 to 5 drops.

Myrrh, stimulant, tonic: Horse 2 to 4 drachms; ox 4 to 6 drachms; ass 2 drachms; sheep 1 to 2 drachms; dog 5 to 20 grains.

Nitre (Potassa Nitrate).

Nitric Acid, tonic, astringent, caustic: Horse 1 drachm; ox 2 drachms; ass 1 drachm; sheep 20 drops; dog 2 to 5 drops.

Nux Vomica, nerve stimulant, tonic: Horse 10 to 30 grains; ox 20 to 40 grains; ass 10 to 20 grains; sheep 5 to 15 grains; dog  $\frac{1}{2}$  to 3 grains.

Oak Bark, astringent: Horse 1 ounce; ox 2 to 4 ounces; ass 1 ounce; sheep 4 drachms; swine 2 to 3 drachms; dog 1 to 2 drachms.

Olive Oil, laxative: Horse 1 to 2 pints; ox 2 to 3 pints; ass 1 pint; sheep 3 to 6 ounces; dog 1 to 3 ounces.

Opium, narcotic, sedative, anodyne, antispasmodic: Horse  $\frac{1}{2}$  to 2 drachms; ox 2 to 4 drachms; ass  $\frac{1}{2}$  to 1 drachm; sheep 10 to 12 grains; dog  $\frac{1}{2}$  to 3 grains.

Opium, Tincture, Laudanum, narcotic, sedative, anodyne, antispasmodic: Horse 1 to 2 ounces; ox 2 ounces; ass  $\frac{1}{2}$  to 1 ounce; sheep 2 to 3 drachms; dog 15 to 30 drops.

Morphia, Muriate, narcotic, sedative, anodyne, antispasmodic: Horse 3 to 5 grains; ox 5 to 10 grains; ass 3 grains; sheep  $\frac{1}{2}$  to 1 grain; dog  $\frac{1}{2}$  to  $\frac{1}{2}$  grain.

Peppermint Oil, stomachic, antispasmodic: Horse 20 drops; ox 20 to 30 drops; sheep 5 to 10 drops; swine 5 drops; dog 3 to 5 drops.

Peruvian Bark (Cinchona).

Pepper, Black, White, stomachic, stimulant: Horse 2 drachms; ox 3 drachms; ass 2 drachms; sheep 1 to 2 scruples; dog 5 to 10 grains.

Pimento, stomachic, stimulant: Horse 2 drachms; ox 3 drachms; ass 2 drachms; sheep 1 to 2 scruples; dog 5 to 10 grains.

Podophyllin, purgative, sedative: Horse 1 to 2 drachms; ox 2 drachms; ass 1 drachm; sheep 10 to 20 grains; swine 6 to 8 grains; dog 1 to 2 grains.

Pomegranate Root Bark, vermifuge: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 2 to 3 drachms; swine 1 to 2 drachms; dog 20 to 30 grains.

Potassa Acetate, antacid, diuretic, diaphoretic: Horse 6 to 8 drachms; ox 1 ounce; ass 4 to 6 drachms; sheep 1 to 2 drachms; dog 10 to 20 grains.

Potassa Nitrate, diuretic, febrifuge: Horse 6 to 8 drachms; ox 1 ounce; ass 4 to 6 drachms; sheep 1 to 2 drachms; dog 10 to 20 grains.

Potassa Bicarbonate, antacid, diuretic: Horse 6 to 8 drachms; ox 1 ounce; ass 4 to 6 drachms; sheep 1 to 2 drachms; dog 10 to 20 grains.

Potassa Chlorate, stimulant, diuretic, refrigerant, antiseptic: Horse 1 to 4 drachms; ass 1 to 2 drachms; sheep 20 to 40 grains; dog 5 to 15 grains.

Potassium Iodine (Iodine).

Lead Acetate (Sugar of Lead), astringent, sedative: Horse 1 to 2 scruples; ox 2 to 3 scruples; ass 1 scruple; sheep 10 to 15 grains; dog 2 to 5 grains.

Lime-water, antacid, astringent: Horse 4 to 5 ounces; ox 4 to 8 ounces; ass 4 ounces; sheep 1 ounce; dog 1 drachm.

Lime, Carbonate, Chalk, antacid, astringent: Horse 1 to 2 ounces; ox 2 to 4 ounces; ass 1 ounce; sheep 2 to 4 drachms; dog 8 to 12 grains.

Lime, Chloride, Chlorinated, cheeks tympany, disinfectant: Horse 2 to 4 drachms; ass 2 drachms; sheep 1 to 2 drachms.

Linseed Oil, laxative: Horse 1 to 2 pints; ox 1 to 2 quarts; ass 1 pint; sheep  $\frac{1}{2}$  pint.

Lobelia sedative, antispasmodic, expectorant: Horse 1 to 2 drachms; ox 1 to 3 drachms; ass 1 drachm; sheep 15 grains; swine 5 to 15 grains; dog 1 to 5 grains.

Magnesia, antacid, laxative, antidote to arsenic: Horse 1 to 2 ounces; ox 2 to 4 ounces; sheep 1 ounce.

Magnesia, Sulphate, Epsom Salts, laxative: Ox 1 to 2 pounds; sheep 4 to 6 ounces.

Mallow, demulcent: Freely.

Mentha Piperita (Peppermint).

Soda, Sulphite, Bisulphite, Hyposulphite, antiseptic, disinfectant, alterative, relieves tympany: Horse 1 ounce; ox 2 to 3 ounces; ass 1 ounce; sheep 2 to 6 drachms; swine 2 to 4 drachms; dog 20 to 60 grains.

Soda Sulphate (Glauber Salts), purgative: Horse 1 to 1 $\frac{1}{2}$  pounds; ox 1 to 2 pounds; ass  $\frac{1}{2}$  to 1 pound; sheep 6 ounces.

Sodium, Chloride (common salt), tonic, vermifuge, purgative: Horse 1 to 2 ounces; ox 2 to 4 ounces; ass 1 ounce; sheep 2 to 4 drachms; swine 1 to 3 drachms; dog 10 to 30 grains.

Santonin, Wormseed, Semen Contra, vermifuge: Horse  $\frac{1}{2}$  to 1 ounce, ass 4 drachms; sheep 2 to 4 drachms; swine 1 to 3 drachms; dogs 10 to 60 grains.

Squill, diuretic, expectorant: Horse  $\frac{1}{2}$  drachm; ox  $\frac{1}{2}$  to 1 drachm; ass 20 to 30 grains; sheep 10 to 15 grains; dog 1 to 5 grains.

Silver, Nitrate (Lunar Caustic), nerve tonic: Horse 5 grains; ox 5 to 8 grains; ass 2 to 4 grains; sheep 1 to 2 grains; dog  $\frac{1}{2}$  to  $\frac{1}{2}$  grain.

Spanish Flies (Cantharides).

Spigelia, vermifuge: Horse  $\frac{1}{2}$  to 1 ounce; ox 1 to 2 ounces; ass  $\frac{1}{2}$  to 1 ounce; sheep 2 to 4 drachms; swine 2 to 3 drachms; dog 1 drachm.

Strychnia, nerve tonic: Horse 1 to 2 grains; ox 1 to 3 grains; ass 1 grain; sheep  $\frac{1}{2}$  to 1 grain; swine  $\frac{1}{2}$  grain; dog 1-40 to 1-10 grain.

Sulphur, expectorant, diaphoretic: Horse 3 to 4 ounces; ox 5 to 6 ounces; ass 3 ounces; sheep 2 ounces; swine 1 $\frac{1}{2}$  to 2 ounces; dog 2 to 8 drachms. Laxative, alterative: Horse 1 ounce; ox 1 to 2 ounces; ass 1 ounce; sheep 6 drachms; dog  $\frac{1}{2}$  to 1 drachm. Parasiticide.

Sweet Spirits of Nitre, Spirit of Nitrous Ether, stimulant, antispasmodic, diuretic, diaphoretic: Horse 1 to 2 ounces; ox 3 to 4 ounces; ass 1 ounce; sheep 3 to 6 drachms; dog  $\frac{1}{2}$  to 2 drachms.

Stramonium, narcotic, sedative: Horse 20 to 30 grains; ox  $\frac{1}{2}$  to 1 drachm; ass 15 to 30 grains; sheep 5 to 10 grains; swine 4 to 6 grains; dog 2 grains.

Sulphuric Acid, tonic, refrigerant, caustic: Horse 1 drachm; ox 2 to 4 drachms; ass 1 drachm; sheep  $\frac{1}{2}$  drachm; swine 20 drops; dog 5 to 10 drops.

Tobacco, sedative, antispasmodic, vermifuge: Horse 4 drachms; ox 4 to 6 drachms; ass 4 drachms; sheep 1 drachm; swine  $\frac{1}{2}$  drachm; dog 5 to 6 grains.

Tar, expectorant, antiseptic: Horse  $\frac{1}{2}$  to 1 ounce; ox  $\frac{1}{2}$  to 2 ounces; sheep  $\frac{1}{2}$  ounce.

Turpentine Oil, stimulant, antispasmodic, diuretic: Horse 1 to 2 ounces; ox 1 to 1 $\frac{1}{2}$  ounces; ass  $\frac{1}{2}$  ounce; sheep 4 to 6 drachms; swine 1 drachm; dog  $\frac{1}{2}$  drachm. Vermifuge: Horse 2 ounces; ox 2 to 3 ounces; ass 1 to 2 ounces; sheep 4 drachms; swine 2 to 3 drachms.

Valerian, diffusible stimulant, antispasmodic, vermifuge: Horse 2 ounces; ox 2 to 4 ounces; ass 2 ounces; sheep  $\frac{1}{2}$  ounce; swine 2 to 3 drachms; dog 1 to 2 drachms.

Valerianate of Iron, nerve tonic: Dog 4 to 5 grains.

Veratrum, sedative: Horse 1 scruple; ox  $\frac{1}{2}$  to 1 drachm; ass  $\frac{1}{2}$  to 1 scruple; sheep 5 to 10 grains; swine 5 to 8 grains; dog 2 grains.

Wild Cherry Bark, expectorant: Horse 1 ounce; ox 1 $\frac{1}{2}$  ounce; ass 1 ounce; sheep 3 drachms; dog 30 grains.

Zinc, Carbonate, astringent, tonic: Horse 2 drachms; ox 2 to 4 drachms; ass 2 drachms; sheep  $\frac{1}{2}$  to 1 drachm; swine  $\frac{1}{2}$  drachm; dog 10 to 15 grains.

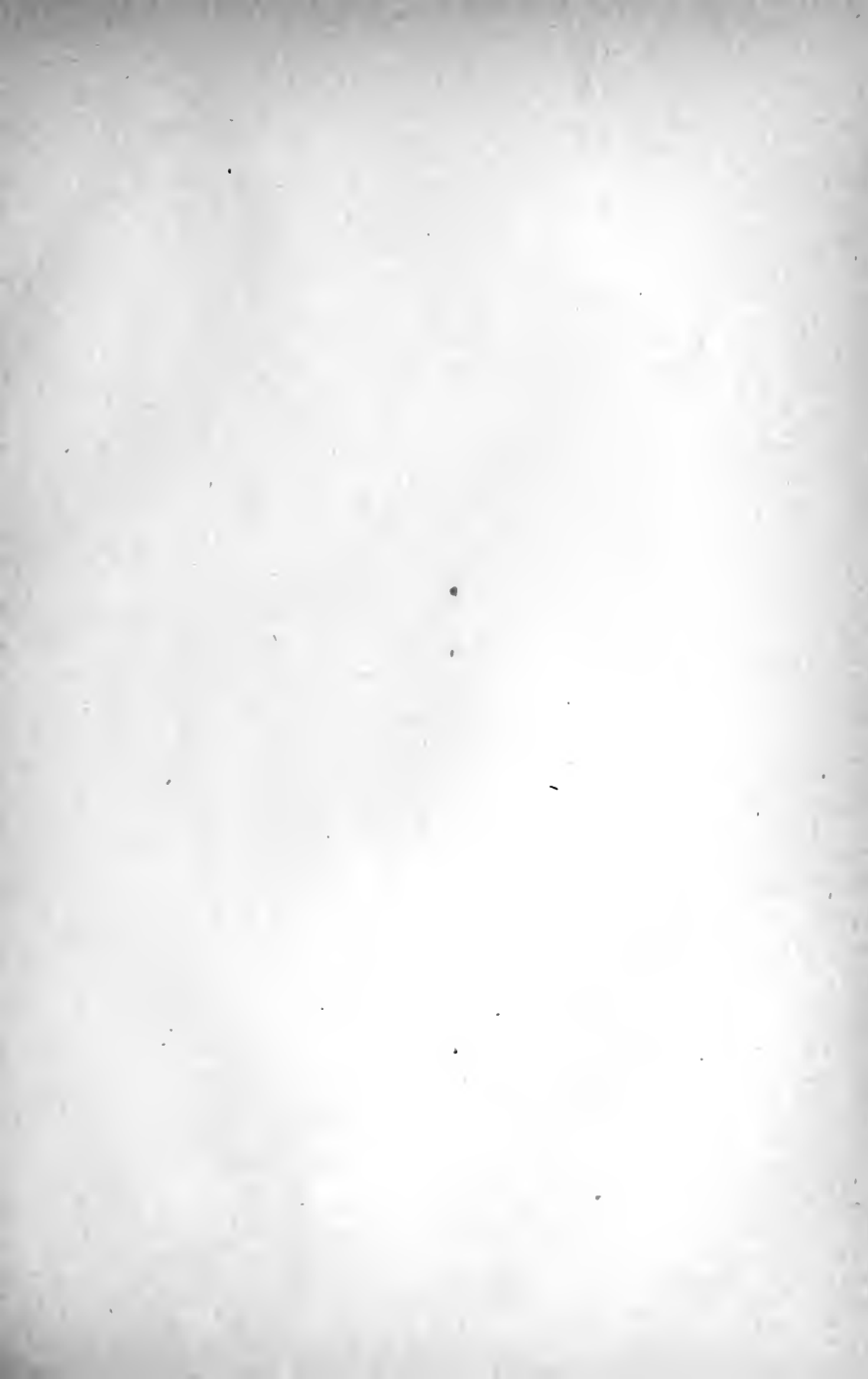
Zinc, Sulphate, astringent, tonic: Horse 1 to 2 drachms; ox 2 to 3 drachms; ass 1 drachm; sheep 15 to 30 grains; swine 10 to 15 grains; dog 2 to 3 grains. Emetic: Swine 15 grains to 1 drachm; dog 8 to 15 grains.

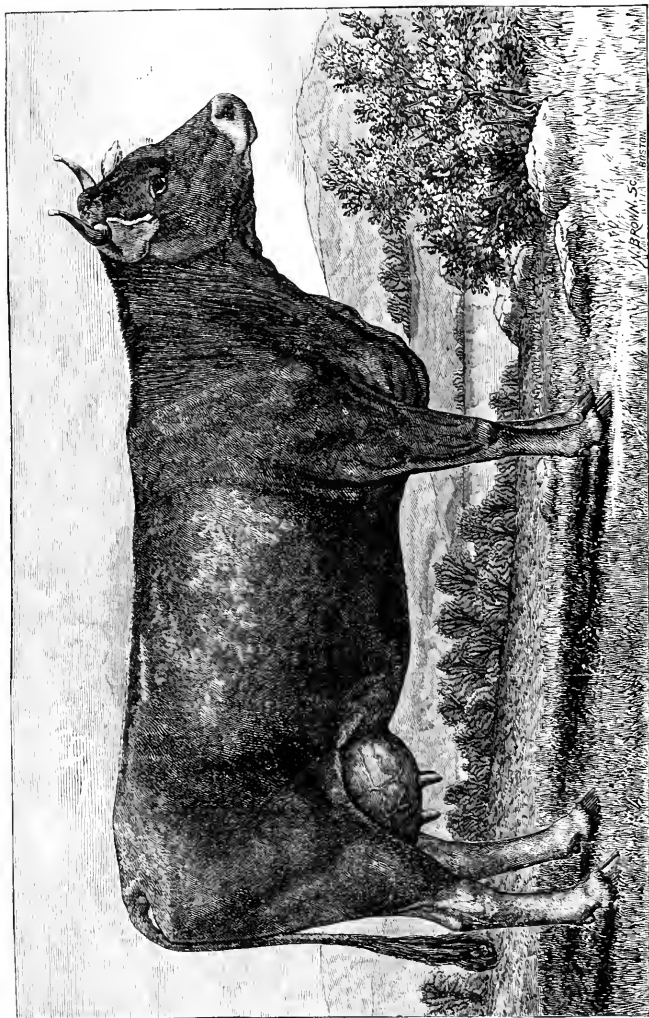
## GLOSSARY OF TERMS.

The following glossary of terms may be found convenient for reference in connection with the description of diseases, their remedies, etc.

- Abnormal*—Irregular.  
*Absorbents*—Medicines used for absorbing; also the vessels of the body which suck up.  
*Acute*—Sharp, severe.  
*Adipose*—Fatty.  
*Adynamic*—Debilitated.  
*Ala*—Wings.  
*Alteratives*—Medicines which change a disease for the better.  
*Anasarca*—Dropsy of cellular membrane.  
*Anasarcous*—Dropsical.  
*Anæmia*—Bloodlessness.  
*Antiseptics*—Medicines opposed to putrefaction.  
*Antispasmodic*—Remedies opposed to spasms or convulsions.  
*Antiphlogistic*—Opposed to inflammation.  
*Aperients*—Medicines which open the bowels gently.  
*Aqueous*—Watery.  
*Ascites*—Dropsy of the belly.  
*Ataxic*—Disordered.  
*Auscultation*—Examination by sounding and listening.  
*Autopsy*—Post-mortem examination.  
*Bifurcation*—Division into two branches.  
*Bolus*—A large pill.  
*Buccal Membrane*—The lining of the mouth.  
*Canthus*—Corner of the eye.  
*Capsule*—Shell or case.  
*Carbonaceous*—Containing carbon.  
*Carminatives*—Medicines which relieve pain by expelling wind from the bowels.  
*Cartilaginous*—Composed of cartilage.  
*Cathartic*—Loosening.  
*Cellular*—Cell-like.  
*Cerebellum*—The brain.  
*Cerebrum*—The brain.  
*Chancrous*—Cancerous.  
*Clinical*—Relating to individual practice.  
*Coma*—Stupor.  
*Comatose*—Stupefied.  
*Conjunctival Membrane*—The membrane which lines the eyelids and covers the eyeball.  
*Cornea*—Transparent coat of the eye.  
*Cranial*—Pertaining to the skull.  
*Cranium*—Skull.  
*Crucial*—Shaped like a cross.  
*Decarbonize*—To purify the air.  
*Diagnosis*—The art of telling the nature of diseases.  
*Diaphoretics*—Medicines which promote perspiration.  
*Diathesis*—Predisposition to certain diseases.  
*Dietetics*—Regulation of diet.  
*Diuretics*—Medicines which increase the flow of urine.  
*Duct*—Canal.  
*Dynamic*—Relating to the vital forces.  
*Emollients*—Substances used to reduce inflammations.  
*Emphysema*—Distention by gas or wind of certain portions of the body.  
*Excretories*—Organs which carry off waste matters.  
*Encephalon*—The brain.  
*Enema*—Injection.  
*Enzootic*—Endemic diseases among animals.  
*Epizootic*—Epidemic among animals.  
*Equilibrium*—Balance.  
*Equine*—Relating to the horse.  
*Etiology*—The doctrine of the cause of diseases.  
*Everementitious*—Useless.  
*Excretory*—Relating to vessels which throw off useless matter.  
*Extravasation*—Escape of a fluid of the body from its vessel into surrounding parts.  
*Exudation*—Oozing through a membrane.  
*Fauces*—The throat.  
*Fleam*—An instrument used in bleeding.  
*Graminivorous*—Feeding on grass.  
*Hæmoline*—The red coloring matter of the blood.  
*Hæmorrhage*—Bleeding.  
*Hippiatric*—Relating to diseases of the horse.  
*Histology*—General anatomy.  
*Hydrocephalus*—Water in the head.  
*Hygiene*—Preservation of health.  
*Ichorous*—Humory.  
*Idiopathic*—Primary affections.  
*Idiosyncrasy*—Peculiarity of constitution.  
*Indurated*—Hardened.  
*Inguinal*—Belonging to the groin.  
*Intercostal*—Between the ribs.  
*Inunction*—The art of rubbing in.  
*Lachrymal Glands*—Those which secrete tears.  
*Lancinating*—Shooting.  
*Laxatives*—Loosening medicines.  
*Lesion*—Disorder.  
*Ligament*—The substance which joins bones together.  
*Mamma*—Breasts.  
*Masseters*—Muscles of the jaws.  
*Morbid*—Diseased.  
*Morbific*—Producing disease.  
*Navicular*—One of the bones of the foot.  
*Neuro-pathology*—The nervous system in disease.  
*Nodulous*—Like a knot.  
*Nosology*—Classification of diseases.

- Edematous*—Swollen.  
*Opaque*—Not transparent.  
*Os calcis*—Bone of the heel.  
*Ossous*—Bony.  
*Oroid*—In the form of an egg.  
*Palatine*—Relating to the palate.  
*Panzootic*—An epidemic affecting animals generally.  
*Parasite*—An animal which lives on another.  
*Parotid*—Largest salivary gland.  
*Pathology*—The study of the body in disease.  
*Pedicle*—Narrow part of a tumor.  
*Petechial*—Resembling flea-bites.  
*Phthisis*—Wasting away.  
*Pituitary Membrane*—Lining of the nostrils.  
*Pseudo-Membranous*—Relating to false membranes.  
*Pus*—Matter.  
*Pylorus*—Entrance into intestines.  
*Rale*—A watery sound heard in sounding the chest in some diseases.  
*Sanative*—Health-giving.  
*Schneiderian Membrane*—The lining of the nostrils.  
*Schaccous*—Of the nature of suet.  
*Sedatives*—Medicines which produce sleep.  
*Serous*—Watery.
- Serum*—Watery part of the blood.  
*Solvent*—That which dissolves.  
*Sporadic*—Scattered.  
*Submaxillary*—Beneath the jaw.  
*Sudamina*—Small eruptions.  
*Supra-renal*—Above the kidney.  
*Thoracic*—Relating to the chest.  
*Thyroid*—Shaped like a folding door.  
*Tonics*—Medicines which give tone and strength to the body.  
*Tubercular*—Relating to tumors in the structure of an organ.  
*Tumefaction*—Swelling.  
*Turbinated Bones*—Bones of the nose shaped like a top.  
*Turgescence*—Great amount of humors in any part.  
*Vascular*—Full of blood-vessels.  
*Ventricle*—Cavity.  
*Virus*—Poison.  
*Vis a Fronte*—Force from the front.  
*Vis a Tergo*—Force of propulsion.  
*Viscous*—Sticky.  
*Voice-box*—Larynx.





**IMPORTED SWISS COW, "ORBIE."**  
Owned by Willis Phelps, North Granby, Conn.

## THE DAIRY.

**T**HE dairy industry has assumed vast proportions in the United States within the last decade; and it may, perhaps, be safe to say that it has made more rapid progress within the last ten years than any other branch of agriculture, embracing, as it does, a wide range of labor, and requiring a great diversity of skill and intellect to insure its most successful advancement. No other country in the whole world contains such natural resources as our own, and when we consider the advancement already made in this department of agriculture alone, and the wide field that lies beyond, almost unexplored, we can justly regard the dairy industry as in its infancy, as well as one of the principal branches of agriculture upon which the future success and prosperity of the whole country shall find the elements of a substantial basis. That the dairying interest of this country is one of vast and increasing magnitude, will be seen by the following reports and estimates on dairy stock and dairy products:

In 1840 the number of milch cows in the United States was estimated at 4,837,043; in 1850, 6,385,094; in 1860, 8,728,863; in 1870, 11,000,000; and in 1880, 12,442,137. The production of butter in 1850 was estimated at 313,250,000 lbs.; in 1860, 469,750,000 lbs., in 1870, 600,000,000 lbs., while the annual butter product of 1880 has been variously estimated at from 1,000,000,000 to 1,400,000,000 pounds, nearly all of which was consumed at home, the exported product being estimated at only 39,236,658 lbs.

In 1860 the production of cheese in the United States was reported to be 103,750,000 lbs.; in 1870, 275,000,000 lbs.; in 1880, 400,000,000 lbs. In 1860 the cheese exported from this country amounted to 15,750,000 lbs.; in 1870, 70,000,000 lbs.; and in 1880, 127,553,967 lbs. Notwithstanding the rapid advancement and growth of dairy husbandry in the United States, the supply of dairy products is quite unequal to the demand; those which are first class in quality being standard articles throughout the whole civilized world, and will always be in demand, and command remunerative prices.

The American dairy belt and the characteristics of a good dairy country are thus defined by the late Prof. X. A. Willard, who has probably given more attention to the subject of dairying than any other writer on this subject in the country:

"The great American dairy belt lies between the fortieth and forty-fifth parallels of latitude. It stretches from the Atlantic to the Mississippi, and possibly to the Pacific. Within its limits are New England, New York, Pennsylvania, the northern parts of Ohio, Illinois, and Indiana, the greater portion of Michigan, Wisconsin, Iowa, and Minnesota, and a part of the Canadas. Of all this belt probably not more than a third of the land is adapted to dairying. The dairy lands are quite irregular in outline, lying not always continuously together, but often detached, and not unfrequently, if represented on the map, would have the appearance of islands.

The characteristics of a good dairy country are, high, undulating surfaces; numerous springs and streams of never-failing water; a soil retentive of moisture; a sweet and nutritious herbage, that springs up spontaneously and continues to grow with great tenacity; a rather low average temperature; frequent showers, rather than periodical drouths, and sufficient covering of the ground in winter to protect grass roots, so that the herbage may be permanent and enduring.

Doubtless within the limits of the United States, on high table lands, or on the lower slopes of mountainous ranges, there are soils eminently adapted to dairying; but we have no large and continuous stretch of country, like that to which we have referred, where the business naturally would develop itself into a specialty."

**Milk and its Composition.**—Successful dairying, as with every other kind of busi-

ness, requires certain essentials, in the knowledge and practice of which its highest possibilities may be attained. These essentials may, perhaps, be briefly summarized in a knowledge of the nature of milk and its treatment in various relations; its manufacture into different dairy products, their care and preservation; a knowledge of the art of successful breeding,—breeding for a specific object; the management of dairy cattle in health and disease; the production of their food, etc.

Milk is the liquid secreted by the mammary glands of female mammalia for the nourishment of their young, and although the milk of each species of animals of this order has its peculiarities, differing somewhat from that of every other species, it is always a white, opaque fluid, sometimes of a bluish and sometimes of a yellowish tint, having a slight, agreeable odor and sweet taste. It contains a fatty substance, which forms butter; casein, which forms cheese, and a watery residuum, called serum or whey, in the manufacture of cheese.

The fatty globules, commonly known as butter globules, are generally round in form and of unequal size, varying from  $\frac{1}{800}$  to  $\frac{1}{250}$  of a line in diameter. Under the microscope they are seen to float about in the serum or watery portion of the milk. They are so very minute that they readily filter through the finest paper. The fatty or butyraceous matter in milk varies, according to its richness, from two and a half per cent. to six and a half per cent., or more of its weight; the caseous or cheesy matter from three to ten per cent., and the watery or serous matter called "whey," from eighty to ninety per cent. When milk is permitted to stand undisturbed for a time, the fat or butter globules rise to the top and form a layer of cream; this separation of fat and serum is, however, never complete, each retaining a portion of the other.

If cream rose to the surface of milk entirely free from other elements, it would appear in the form of pure butter, and would not require the process of churning to separate it from the other matter which it contains. A high temperature hastens the separation of the caseous matter or curd from the whey. This separation sometimes takes place so rapidly from the effects of great heat or sudden changes in the atmosphere that sufficient time is not allowed for the butter globules to rise to the top, and hence they become mixed with the curd. Milk, upon standing, separates into curd and whey, becoming sour by the change of its sugar of milk into an acid known as lactic acid. It is owing to the presence of this sugar, and the chemical changes that take place in consequence, that milk undergoes the different degrees of fermentation. An intoxicating liquor may be made from milk by fermenting it, followed by distillation, which produces pure alcohol.

The Tartars and Arabs make much of their spirituous liquors in this way from camel's milk.

**Relative Nutritive Value of Milk.**—It will be seen by a cursory examination of the following table, given by Dr. Bellows, that milk, as an article of food, is not usually rated at its actual worth. It gives the comparative nutritive value of several articles of food in their natural state, and will be found convenient for reference and comparison:

THE RELATIVE NUTRITIVE VALUE OF MILK.

|                        | NITRATES. | CARBONATES.  | PHOSPHATES. | WATER. |
|------------------------|-----------|--------------|-------------|--------|
| Milk of Cow, . . . .   | 5.0       | 8.0          | 1.0         | 86.0   |
| Beef, . . . . .        | 15.0      | 30.0         | 5.0         | 50.0   |
| Lamb, . . . . .        | 11.0      | 35.0         | 3.5         | 50.5   |
| Mutton, . . . . .      | 12.5      | 40.0         | 3.5         | 41.0   |
| Pork, . . . . .        | 10.0      | 50.0         | 1.5         | 38.5   |
| Codfish, . . . . .     | 14        | very little. | 5 to 6      | 79     |
| Trout, . . . . .       | 17        | very little. | 5 to 6      | 75     |
| White of eggs, . . . . | 15½       | none.        | 4½          | 80     |

It appears that milk contains all the elements of nutrition, the nitrates, carbonates, and phosphates, and is more wholesome than meats like pork and veal, which may jointly be looked upon with suspicion, more frequently than they are by their consumers. It should be more extensively used than it is in hot weather, especially in the diet of children, since it supplies the material for building up the bones and the muscles to a much greater degree than many other articles of food in common use. We would not wish to be understood as advising substituting milk wholly for meat in any system of diet; but if a smaller quantity of meat were used, and a larger quantity of pure, sweet milk than commonly forms the diet of our people generally, a higher standard of health would doubtless be the result.

**Analysis of Milk.**—A chemical analysis of cow's milk shows the presence of butter globules composed of various fats; nitrogenous matter, which includes albumen and casein; sugar of milk, and the ash elements; certain volatile oils, gases, etc. Besides these elements there are occasionally found various organic forms.

Prof. James Law gives an account of the passage of fungi spores from the blood of animals, and their appearance in the milk. The following is an analysis of cow's milk, as given by Haidleu:

## ANALYSIS OF MILK.

|                              |      |                                     |      |
|------------------------------|------|-------------------------------------|------|
| Water, . . . . .             | 87.3 | Phosphate of magnesia, . . . . .    | .042 |
| Butter, . . . . .            | 3.   | Phosphate of Iron, . . . . .        | .007 |
| Casein, . . . . .            | 4.82 | Chloride of Potassium, . . . . .    | .144 |
| Sugar, . . . . .             | 4.39 | Chloride of Sodium, . . . . .       | .024 |
| Phosphate of lime, . . . . . | .23  | Soda combined with cream, . . . . . | .042 |

The quantity and quality of milk furnished by cows varies with the breed, the age of the cow, the age of the calf, the food, and the general treatment the animal receives, etc. The yield of milk diminishes as the calf grows older.

By experiments to ascertain the proportionate diminution of yield, it has been found that the total yield of a fair milker for the first fifty days after the birth of the calf was 1,200 quarts, or at the average rate of 24 quarts per day; for the second fifty days, 1,000 quarts, or 20 quarts per day; third, 700 quarts, or 14 quarts per day; fourth, 400 quarts, or 8 quarts per day; fifth, 400 quarts, or 8 quarts per day; sixth, 300 quarts, or 6 quarts per day; the total yield for ten months being 4,000 quarts, or about 8,000 pounds of milk.

**Difference in Quality of One Milking.**—It is commonly known that the milk that is last drawn from the udder of the cow in milking is much richer in cream elements or butter globules, than that which is first drawn. The reason usually given for this is the same as that which causes the cream to rise to the surface when set in an open vessel; the butter globules, of which the cream is largely comprised, being lighter than milk they rise and remain at the top. But we think there is a more natural way of accounting for the last part of the milk being the richest.

The udder of the cow, which is the more immediate receptacle of milk, and in which other milk-vessels terminate, is divided into two sections, each of which is subdivided into two others, thus making four divisions, each of which is in itself to a certain extent an organ of milk secretion. The lateral section, or that comprising the two hind teats, usually secretes larger quantities of milk, and is usually larger than the front section. These sections are not a continuous cavity or sack like a bladder, being composed of an immense number of small cavities or reservoirs for holding milk, varying in size from those so minute that a microscope would be necessary to distinguish them, to those of a large sized pea. These small cavities, which are only enlargements of the milk tubes in the udder, are to a certain extent distinct from each other, yet in a measure connected, the same as the blood vessels. All the milk veins and tubes in each quarter of the udder finally come together and terminate in a single tube in the teat.

The milk of each section, as it is secreted, naturally moves through the milk veins in the direction of the teat. The walls of these milk veins and cavities are always collapsed and in contact, when not distended with milk; with this constant inclination to a collapsed condition, it is very apparent that a liquid would force its passage through them much more easily than a solid, hence the cream globules, being solid particles of fat, would not make their passage along the ducts as readily as the liquid portion, and would naturally be left behind in the passage to the teat, consequently the last part of the milking would contain the most cream. The larger the cream globules, of course the more difficulty they would meet in moving along in the milk tubes, and the greater would be the difference in the quality of the milk between the first and last of the milking; hence in such breeds as the Channel Island cows, which are noted for milk containing large butter globules, there is a greater difference between the first and last of a milking, than in the milk of such breeds as the Holstein, in which the globules are comparatively small.

Schubler found by experiment that in dividing the milk at a milking into five equal parts, the first portion produced 5 per cent. of cream; the second 8 per cent.; the third 11.5 per cent.; the fourth 13.5 per cent.; fifth or last 17.5 per cent.; the average being 11 per cent. It will be seen by the above experiment, that in this case the last of the milking contained considerably more than three times the amount of cream than the first. In many cows the difference would doubtless be greater than this. This difference in the quality of milk at the same milking, shows that the custom which prevails in some countries of driving cows from house to house, and supplying their customers with milk warm and fresh from the udder, would result in furnishing the customers last served, with milk of a much richer quality than the first.

**Selecting Cows for the Dairy.**—With the dairyman, the cow is the machine that manufactures the staple of his dairy products. As the manufacturer of cotton, woolen, or any other kind of fabric finds it for his very highest interest in business to select the very best machinery for the making of his goods, it is quite as important that the dairyman use especial care in the selection of his herd of cows, since it is in this way alone that the most satisfactory results both in quality and quantity can be attained, while it costs no more to maintain good and profitable cows than poor ones. Notwithstanding each breed has its own peculiar characteristics (which have already been described in this work), it is a well known fact, that individuals of a breed differ very materially with respect to milk production, both in the amount produced and the quality; and the dairyman who depends upon breed alone, without regard to a judicious selection, must unavoidably meet with disappointment.

While each breed has its own peculiar marks by which it may be distinguished from all others, there are certain points that cannot be overlooked, and which all good milkers possess to a greater or less extent. Thus we have different systems of classifying dairy stock such as those adopted by Pabst, Magne, Guenon, and others. No single mark, however well developed, can invariably be depended upon as a sure indication of extraordinary milking powers, but when several of the external marks of a great milker are found combined in a single animal, they may, as a general rule, be relied upon with a good degree of certainty.

In fact, it is claimed by some that a system so complete may be established that one versed in it will be enabled to go into a herd and select the best cows, those of a medium quality, and the worthless animals, in a very short time, and can determine with a good degree of certainty about how many quarts of milk the animal will produce daily, the quantity of butter it will make, about how long a time she will continue to give milk after calving, whether the calf will be profitable to keep, or whether it should be sent to the butcher; also whether the bull will get good dairy stock. To attain this skill in selection will of course require close observation and experience, but if such a system could be

established and made so clear and simple as to come within the ready comprehension of every one, it would prove of immense and incalculable value.

After determining the age of a cow, the constitution and health of the animal should next be considered. A good constitution is usually accompanied with good lungs, a chest that is broad, ribs broad and well spread, slow and regular respiration, and a good appetite. When such a cow is in milk she will require considerable water, as a large secretion of milk usually induces a strong inclination to drink; the digestive organs will be active and energetic, and an abundance of good, healthy blood will be manufactured, which will result in the milk glands being stimulated to large secretion. When not giving milk, such cows will fatten readily.

Cows with small and weak lungs, poor appetite, close ribs, and active milk glands, will generally possess a feeble constitution; and if they give a plentiful supply of milk, it will generally be of bad quality. Such cows are apt to have diseased lungs. They will never fatten readily when dry, however well they may be fed. As a general rule, dairymen regard the large breeds and heavy milkers, such as the Holsteins, best adapted to the manufacture of cheese, such milk containing the largest proportionate amount of casein, or cheese element, while the smaller breeds, giving a less quantity of milk but of richer quality, or more of the butter element, such as the Jersey and Guernsey, are best suited to the production of butter.

Some of the external marks of a good milker are given as follows, by the editor of this work in his "Milch Cows." In order to have no superfluous flesh, the cow should have a small, clear, and rather long head, tapering towards the muzzle. A cow with a large, coarse head will seldom fatten readily, or give a large quantity of milk. A coarse head increases the proportion of weight of the least valuable parts, while it is a sure indication that the whole bony structure is too heavy. The mouth should be large and broad; the eye bright and sparkling, but of a peculiar placidness of expression, with no indication of wildness, but rather a mild and feminine look. These points will indicate gentleness of disposition. Such cows seem to like to be milked, are fond of being caressed, and often return caresses.

The horns should be small, short, tapering, yellowish, and glistening. The neck should be small, thin, and tapering towards the head, but thickening when it approaches the shoulder; the dewlaps small. The fore-quarters should be rather small when compared with the hind-quarters. The form of the barrel should be large, and each rib should project farther than the preceding one up to the loins. She should be well formed across the hips and in the rump. The spine or back-bone should be straight and long, rather loosely hung, or open along the middle part, the result of the distance between the dorsal vertebrae, which sometimes causes a slight depression or sway back. By some good judges this mark is regarded as of great importance, especially when the bones of the hind-quarters are also rather loosely put together, leaving the rump of great width, and the pelvis large, and the organs and milk-vessels lodged in the cavities largely developed.

The skin over the rump should be large and flexible. This point is of great importance; and as, when the cow is in low condition, or very thin in flesh, it will appear somewhat harder and closer than it otherwise would, some practice and close observation are required to judge well of this mark. The skin all over the body should be soft and mellow to the touch, with soft, glossy hair. The tail, if thick at the setting on, should taper, and be fine below. But the udder is of special importance. It should be large in proportion to the size of the animal, and the skin thin, with soft, loose folds extending well back, capable of great distension when filled, but shrinking to a small compass when entirely empty. It must be free from lumps in every part, and of medium size.

Nor are the milk-veins less important to be carefully observed. The principal ones under the belly should be large and prominent, and extend well forward to the navel, losing

themselves apparently, in the very best milkers, in a large cavity in the flesh, into which the end of the finger can be inserted; but when the cow is not in full milk, the milk vein, at other times very prominent, is not so distinctly traced; and hence, to judge of its size when the cow is dry or nearly so, this vein may be pressed near its end, or at its entrance into the body, when it will immediately fill up to its full size. This vein does not carry the milk to the udder, as some suppose, but it is the channel by which the blood returns; and its contents consists of the refuse of the secretion, or what has not been taken up in forming milk.

There are also veins in the udder, and the perineum, or the space above the udder, and between that and the buttocks, which it is of special importance to observe. These veins should be largely developed and irregular or knotted, especially these of the udder. They are largest in great milkers. The knotted veins of the perineum extending from above, downwards in a winding line, are not readily seen in young heifers, and are very difficult to find in poor cows, or cows of only a medium quality. They are easily found in very good milkers, and, if not at first apparent, they are made so by pressing upon them at the base of the perineum, when they swell up, and send the blood back towards the vulva. They form a kind of shield net-work under the skin of the perineum, raising it up somewhat, in some cases near the vulva, in other cases lower down and nearer to the udder. It is important to look for these veins, as they often form a very important guide, and by some they would be considered as furnishing the surest indications of the milking qualities of the cow.

Their full development almost always indicates an abundant secretion of milk; but they are far better developed after the cow has had two or three calves, when two or three years' milking has given full activity to the milk glands, and attracted a large flow of blood. The larger and more prominent these veins, the better. It is needless to say that in observing them some regard should be had to the condition of the cow, the thickness of skin and fat by which they may be surrounded, and the general activity and food of the animal. Food calculated to stimulate the greatest flow of milk will naturally increase these veins, and give them more than usual prominence.

Magne states that in Flanders, a cow is considered a good milker, "especially when towards the middle of the spine the apophyses (or projections) are separated or scattered so as to leave a space between of about two finger-breadths," for the reason that, when the spine is thus formed, the haunches are better spread, and the thighs and croup larger. The other members of the body in such cases are also better developed, the basin ampler, and the organs placed in this cavity, as well as the udder, are more voluminous. Besides the parts already mentioned, much can also be determined by an examination of the escutcheon, or what is called the milk-mirror in cows.

**The Guenon System.**—This system is so called from the name of its founder, whose discovery, whatever may be said of it, has proved of vast importance to agriculture. Francis Guenon was a herdsman in France, a man of great judgment and penetration, a close observer, and an excellent judge of stock. He was born in Bordeaux, in humble circumstances, and in early life had the care of cows. He noticed upon the posterior of cows, on the space above the udder extending to the buttock, and called the perineum, that part of the hair grew contrary to the hair on the remaining part of the animal, and that the surface thus covered varied, assuming different shapes, and that a connection existed between these external marks and certain ones on the udder, and the milking qualities of the cow. To these marks he gave the name of milk mirror or escutcheon. By these marks, according to Guenon's system, it is claimed that not only the milking qualities of a cow can be determined, but also the length of time a cow will continue to give milk, thus instructing how to avoid purchasing such cows as when pregnant begin to fail rapidly in their milk, and go dry too early to be profitable. After many years of experiment and testing, based upon the form and size of

the escutcheon, Guenon reduced the result of his practice and experiments into a system, and finally published a work upon the subject, which met with much favor, receiving premiums in the form of gold medals and other rewards from agricultural societies, and by the government with a pension for life of three thousand francs.

This work was translated in this country, and had an extensive sale. After several years of practice with it, he rearranged the system, enlarging the number of classes and decreasing the number of orders, thus making it more simple and easily understood, also adding important information respecting bulls, thus revising his former work. Guenon's system included not only the size and form of the milk mirror or escutcheon, but the character of the hair growing upon it, the color of the skin under it, and also the quality of the skin. Thus, to be first-class, the escutcheon must not only be of proper size and form, but the hair upon it must be short, soft, and furry, and the skin under it soft, like a fine kid glove, oleaginous to the touch from the presence of fine dandruff, while the nearer the color approaches to a copper or nankeen hue the better, the hue of the skin denoting the *quality* of the yield. Guenon therefore claimed for his system that it determined the quantity of milk which a cow would yield; the period which she would continue in milk, and the quality of her milk; these rules being alike applicable to calves and bulls, for by them may be determined whether it will pay to raise a calf, or to dispose of it to the butcher, and whether a bull would be likely to transmit good milking qualities to his progeny. Guenon's system, as simplified, is still a complicated one, and while it is of immense value to agriculture, is thought by some to be an attempt to prove too much.

However this may be, it arranges the escutcheon into ten classes, and each of these classes into six orders, which makes sixty divisions or different shapes of which to acquire a knowledge. Besides these there are also ten exceptions or faulty escutcheons that he calls "bastard" escutcheons, which, although bearing so close a resemblance to the others that the practiced eye may be easily deceived, yet differ from them in their yield. Of these Guenon says:

"I have adopted the word 'bastard' to denote those cows which give milk only so long as they have not been got with calf anew, and which, upon this happening, go dry all of a sudden, or in the course of a few days. Cows of this kind are found in each of the classes, and in every order of the class. Some of them are great milkers, but so soon as they have got with calf their milk is gone. Others present the most promising appearance, but their yield is very insignificant."

The system may be greatly simplified by paying little or no attention to any cows bearing escutcheons below the third order of any of the classes, as it would not be a paying investment to purchase or raise a cow with an escutcheon of a low order, it being the opinion of good judges in the practice of this system that when a cow does not bear an escutcheon of the third order of any class, she is not a profitable milk-producer.

Previous to Guenon's discovery, the milk points recognized in France, Germany, Belgium, Switzerland, and England, were as follows, although in no one of the above-mentioned countries were all of these marks known and recognized:

*Favorable Milk Marks.*—A broad, large mouth; yellow, short, thin horns; delicate, soft, short, and close hair; broad, well-spread ribs; broad chest; thin, long tail; straight hind legs; regularly arched udder, covered with a short, close, silky down; four teats of equal length and thickness; thick, projecting lacteal veins, which run along under the belly from the udder towards the fore-legs, forming a fork at the end, and finally losing themselves in a round cavity; the milk-wart in the middle of the lower jaw, at the broadest part, nearer to the mouth than the throat.

*Unfavorable Milk Marks,* before Guenon's discovery, were recognized as follows: long thick horns; long, narrow, pointed head; bull-like, puffy neck; indented, pointed spine;

short, narrow ribs, not much bent; short, thick tail; thin, long, bristly hair; unequally vaulted udder, with a few long hairs; teats of unequal length and thickness; hind legs like those of a goat, bent in the form of a sickle; thin lacteal veins, almost imperceptible without a fork, terminating in a point and without any, or with a very small and shallow indentation at the end; when the milk-wart is nearer the throat than the lower lip.

It will be noticed that among these favorable and unfavorable signs, there is no one of them that is in itself reliable, but several of them must be combined; neither do they indicate the yield of milk, the duration of the yield, or give any hint with regard to selecting male animals that will perpetuate the desirable qualities of a breed. If the Guenon system can be relied upon to the extent, or even to a moderate extent, of what its advocates claim, it has certainly proved of great utility in the selection of animals for the various purposes of dairy use.

It seems to us that the classifications adopted by Pabst, Magne, and others, appear to be far more simple and satisfactory than the more complicated classification of Guenon. Without pretending to judge with accuracy of the quantity, the quality, or the duration which a particular size or form of the mirror will indicate, they give to Guenon the full credit of his important discovery, a new and valuable element in forming our judgment of the milking qualities of a cow, and simply assert with respect to the duration of the flow of milk, that the mirror that indicates the greatest quantity will also indicate the longest duration.

The attention of the editor of this work was called to Guenon's method of judging cows several years ago, and since that time we have examined many hundreds, with a view to ascertain the correctness of its main features, inquiring, at the same time, after the views and opinions of the best breeders and judges of stock with regard to their experience and judgment of its merits; and the result of my observations has been that cows with the most perfectly developed milk-mirrors or escutcheons are, with rare exceptions, the best milkers of their breed, and that cows with small and slightly-developed mirrors are, in the majority of cases, bad milkers.

We say the best milkers of *their breed*, for we do not believe that precisely the same sized and formed milk-mirrors on a Hereford, or a Devon, or an Ayrshire, will indicate anything like the same or equal milking properties. It will not do, in our opinion, to disregard the general and well-known characteristics of the breed, and rely wholly on the milk-mirror. But we think it may be safely said that, as a general rule, the best marked Hereford will turn out to be the best milker among the Herefords, all of which are poor milkers; the best marked Devon, the best among the Devons; and the best marked Ayrshire, the best among the Ayrshires; that is, it will not do to compare two animals of entirely distinct breeds by the milk-mirrors alone, without regard to the fixed habits and education, so to speak, of the breed or family to which they belong.

It is true that there are breeds, such as the Short-Horns, for instance, that are inferior milkers, when compared with some others; and yet we often find on them very fine escutcheons, and this fact may at first seem to conflict with the Guenon system; but it must be remembered that the Short-Horns were originally a good milk breed, and that having been made particularly a beef breed for a long time, the milking propensity has, in most families, been to a great extent bred out, and hence, notwithstanding this change, they may retain the escutcheon more as a characteristic mark of the original breed than as a mark of milking quality. Without regarding the escutcheon as an infallible sign of the quantity and quality of milk, we believe it to be one of the best indications of the milking quality that nature has given; but, as has been previously implied, in the use of the Guenon system there must be taken into consideration the breed, the age, the feed, the treatment past and present, the health, etc.

**The Escutcheon.**—The escutcheon is that surface of the udder, perineum, and the thighs, where the hair grows upward or contrary to that on the remaining portion of the body. Escutcheons may extend, according to their class, from the center of the four teats to the level of the upper extremity of the vulva, or fall considerably short of it, sometimes reaching in those of a lower class not half that distance; in any case, the broader it extends upon the thighs, and the lower down and higher up the broad portion covers, and the higher up and the broader the vertical portions are, and the more uniform the shape, the more perfect the escutcheon.

Escutcheons are classified according to their form or configuration, and characterize and distinguish the ten classes which constitute Guenon's system, each class being estimated by the limits of the escutcheon. The extreme limits are the hams, the interior surface of the legs, and the vulva, variations from these limits determining the different grades. The lower half or broadest portion of the escutcheon is of nearly similar shape in all the classes, the principal difference being that in the lower classes it is not so broad or so high up, while the vertical portions gradually diminish in height and width until, in the tenth class, there are none.

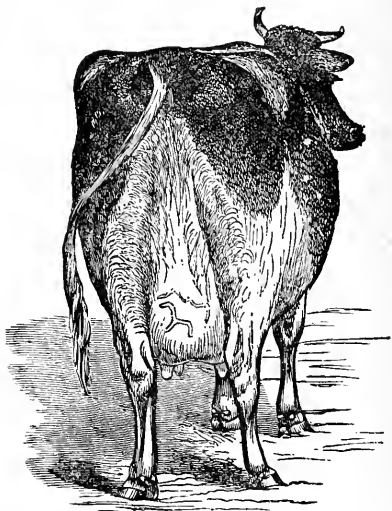
The lower part of the escutcheon, or that running out on the thighs, is sometimes called the thigh escutcheon, while the upper part which extends up to or towards the vulva is called the vertical portion. The thigh escutcheon in all classes resembles in outline a round-pointed shovel, while the vertical portion resembles somewhat the handle. The vertical or upper portions are what distinguish mostly one escutcheon from another, and it is in this part that the blemishes usually appear.

According to the Guenon system, the thigh escutcheon indicates the *quantity* of milk the cow will give; the upper portion, or vertical escutcheon, the time she will continue in milk; and the color of the skin, the feel of it, and the character of the hair on the escutcheon, the *quality* of milk.

In connection with these three points, there are two other considerations, and these are the size and breed of the animal. Guenon graded his estimates for three sizes of cows, the high, the medium, the low. It would be absurd to judge of the large-sized breeds with those of the small, such as the Jersey, for instance, on these points, although both might have escutcheons of the first order.

A *good escutcheon* may be described as follows: A large mirror, having the same form on both sides; continuation of the mirror and of the same color and quality of hair under the tail, the further the better; yellowish hair in the mirror, from which, on rubbing, a yellowish dust or dandruff appears; close, fine, soft, silky hair in the mirror on the udder, and in the secondary marks.

A *poor escutcheon*, or bad signs in a milker, are: A small and irregular mirror; coarse, bristly, thin hair in the mirror, on the udder, and in the secondary marks; large secondary signs. As a general rule, the coarser and longer the hair the poorer the milk.



ESCUTCHEON OR MILK-MIRROR.

Prof. Arnold, a high authority on dairy matters, says: "The size of the escutcheon is regarded as the measure of the quantity of blood supplied to the milk-producing vessels, and is evidence of their capability of elaborating milk. In the same way, the veins take up the blood and carry it back in the milk-veins, which pass through the bag and along the belly, and enter the body through one or more holes on their way to the heart. The size of the milk veins and the holes where they enter the body vary with the escutcheon, and, like it, give evidence of the quantity of venous blood passing away from and through the udder, and they have the same significance with reference to quantity as the supply of arterial blood and the size of the escutcheon."

But none of these indications, taken singly, is an infallible evidence of large yield. They must be considered together. A large escutcheon and milk-veins, coupled with a small stomach, would be marked down at least one-half of what they might otherwise signify; and a large digestive apparatus, coupled with small milk-veins and escutcheon, should be marked down in the same way. Keeping the leading indications in view, observation will soon enable one to make close estimates."

**The Escutcheon on Bulls.**—Bulls have also escutcheons similar to those of cows, and it is highly important that the escutcheon of the bull should be first-class. He should also have fine hair and a soft, yellow skin, for such an animal will transmit these qualities to his progeny; and the larger and better the escutcheon of the bull is, the better marked cows in this respect he will get.

Only bulls having these three points well developed should be used for breeding, as they will stamp in like manner their descendants, and as they get so many animals yearly, while a cow gets only one, it is all the more important that the bull should be first-class, although first-class cows should be used as far as possible. Mr. Willis P. Hazzard, a well-known authority on this subject, says that he has gone through herds and picked out every animal gotten by one and the same sire, solely by these marks.

**The Ovals.**—There is also another mark which accompanies a good escutcheon, and that is one or two ovals just above the hind teats on the udder, on which fine, soft hair grows downward. The hair on them is usually a little whiter and more shiny in appearance than that on the remainder of the udder. These ovals may be large or small, alike or unlike in size, and are always a good sign. The larger and more uniform they are, and the finer and softer the hair is on them, the better.

There is still another good mark that may be noticed in connection with the escutcheon; this is an oval on either side, where the vertical loses itself in the thigh escutcheon. These are called *thigh ovals*. The hair here makes a semicircular dip into the broad part of the escutcheon. If the hair here is fine and short, it is considered by good judges an excellent sign.

**Magne's System of Selecting Cows.**—As beginners in farming, or even those of long practice, often pay dearly for experience, and as all may be profited by an enumeration of points for the selection of good milch cows, we give a few valuable hints from a work by Prof. J. H. Magne, as follows:

"Where the digestive organs are defective, good milch cows are rarely met with, since these organs have a powerful influence on the exercise of all the functions, and particularly on the secretion of the milky glands. A good state of the digestive organs is evinced by a belly of moderate size, with yielding sides; a large mouth; thick and strong lips; a good appetite; easy and quick digestion; glossy hair; supple skin, with a kind of unctuous feel. The constitution should be sound, and this is implied by large lungs; a broad and prominent chest; a somewhat slow respiration; and a great inclination to drink—an inclination stimulated by the abundant secretion of milk. Preference should be given to cows with

small bones, fine and slender limbs, and tail fine at its base; the head small but longish, narrowing toward the horns; the horns themselves of a bright color, tapering finely and glistening; small neck and shoulders, apparently long because slender, especially near the head; small eyelids well divided, but not much wrinkled; prominent eye, and a gentle, feminine look.

Good milkers allow themselves to be easily milked — often while ruminating they look with pleased eye (easily recognized) at the person who milks them; they like to be caressed, and caress in return. The udder is formed principally by the glands which secrete the milk, and called the milky glands. These, four in number, two on each side, are designated by the name of 'quarters,' each constituting nearly a fourth part of the udder. The udder is composed, moreover, of skin, cellular tissue, fat, lymphatic ganglions, vessels, etc. In almost all cows the abundance of the milk is in proportion to the size of the mamelles. The marks indicating that these glands are constituted so as to produce much milk are: a very large development of the hind quarters; a wide and strong lumbar region; a long rump; haunches and hind legs wide apart; a large space for lodging the udder; milky glands well developed, and causing the udder to be of considerable size. In good cows the gland constitutes a large part of the udder, and accordingly after milking it shrinks much and becomes soft, flabby, and very wrinkled. The teats should be set apart from each other, as indicating that the milk vessels are spacious. Of all the marks for ascertaining good cows, the best are afforded by the blood vessels; if the veins which surround the udder are large, winding, and varicose, they show that the glands receive much blood, and consequently that their functions are active and that milk is abundant. The veins on the lateral parts of the belly are easily observed. These veins issue from the udder in front, and at the outer angle, where they form, in good cows, a considerable varicose swelling. They proceed toward the front part of the body, forming angles more or less distinct, often divide toward their anterior extremity, and sink into the body by several openings."

**Effect of Food on Milk.** — The kind of food given milch cows has a decided influence on the quality and quantity of milk they produce. A half-starved cow will yield but little milk, and the milk will be of inferior quality, while a well-fed cow will give an abundant supply of nutritious milk. A liberal amount of food rich in nitrogenous and phosphatic elements of nutrition, will at once influence both the quantity and quality of the milk. Dr. Voelcker, Chemist to the Royal Agricultural Society of England, says that the finest flavored milk and butter are produced by cows which in summer are fed entirely on grass and rich permanent pastures, and in winter on hay made of fine, sweet grass. He also says:

"Milk may be regarded as a material for the manufacture of butter and cheese, and according to the purpose for which the milk is intended to be employed, whether for the manufacture of butter, or the production of cheese, the cows should be differently fed.

Butter contains carbon, hydrogen or oxygen, and no nitrogen. Cheese on the contrary, is rich in nitrogen. Food which contains much fatty matter, or substances which in the animal system are readily converted into fat, will tend to increase the proportion of cream in milk. On the other hand the proportion of casein or cheesy matter in milk is increased by the use of highly nitrogenized food. Those therefore who desire much cream, or who produce food for the manufacture of butter, select food likely to increase the proportion of butter in the milk. On the contrary, when the principal object is the production of milk rich in curd — that is, when cheese is the object of the farmer, clover, peas, and bean meal, and other plants which abound in Legumin — a nitrogenized organic compound, almost identical in properties of composition with casein, or the substance which forms the curd of milk — will be selected."

Turnips make the milk watery, besides imparting a turnip flavor. Mangolds, when fed with three or four pounds of meal, are good. As an auxiliary to the winter food of milch cows

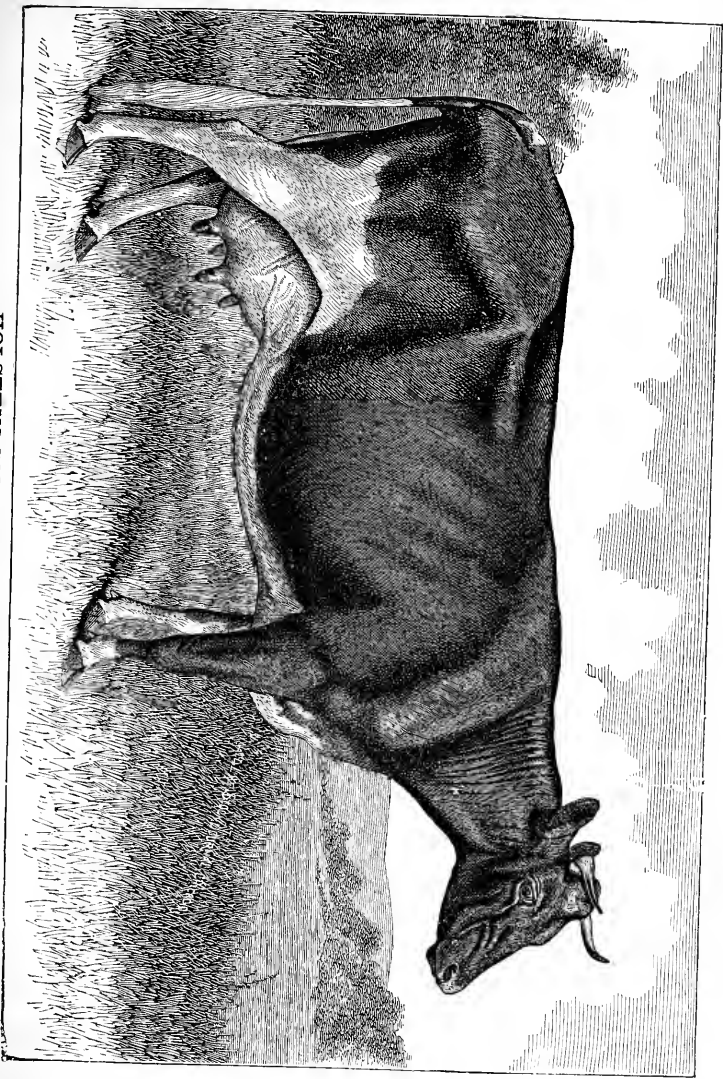
four pounds of bran meal made into a thin mash, with the addition of three or four pounds of bean meal, makes an excellent ration. If to the foregoing we add twenty-five pounds of mangolds and a due portion of hay or straw chaff, we will supply a food mixture which will produce much and excellent milk. Brewers' grains are often a staple food in town dairies; and even in their wet condition as obtained from the breweries, contain a fair proportion of ready-made fat and flesh-forming matter. They should, however, be fed only in moderate quantities, and in connection with other articles of food. Still slops, or the swill of distilleries, and garbage are too frequently used as the food of cows in milk dairies in the vicinity of large cities, the effect of which is not only to soon cause disease and an enfeebled constitution of the animal fed upon it, but the milk thus produced is entirely unfit for any edible purpose whatever. Revolting as the very term "swill milk" is to every intelligent and thoughtful person, it requires but a slight investigation to disclose the fact that there are millions of gallons of this diseased and poisoned fluid, — miscalled "milk," — produced in the neighborhood of our large cities, the use of which causes such fearful mortality among the children of New York and other cities. Says a recent writer, referring to this subject:

"Every such milk dairy is a common nuisance; and as such it should be suppressed, and the owners and keepers of them summarily punished, both by fine and imprisonment. And if a 'Humane Society,' or a 'Society for the Prevention of Cruelty to Animals,' exist in the vicinity where these nuisances are kept, the first should compel the health authorities of the municipalities to prohibit the sale of their milk, and thus cease poisoning children, and the other should rescue the poor suffering cows from further torture, and a lingering death. It would be so in a country where law is enforced — for we already have *law* enough to abate these nuisances — but we fear nothing less than a knowledge of the imposition, and a determination on the part of those concerned to refrain from the use of the article, will help the matter. On persons concerned in such establishments, our words, if they ever see them, will make no impression, and we therefore address ourselves to those who pursue an honest and honorable business in their own legitimate dairies."

The trade in watered milk, as well as that which is adulterated by mixing with skim milk, though bad enough and quite too common, is far less injurious in its consequences than the traffic in the poisoned product of animals fed on swill and garbage. Roots are excellent to form a part of the rations of milch cows in the winter and spring; especially the latter Dairy stock that have a liberal daily allowance of roots in connection with other food, almost invariably enter upon grass in a vigorous, healthy condition, and are thus prepared to yield largely in milk through the season. Cotton seed meal is also excellent for milch cows, when fed in proper quantities and in connection with other articles of food. A practical dairyman of large experience states that by feeding cotton seed meal daily to each cow in addition to pasture, the milk yield will be largely increased, and that if he is out of this article of food for only one day, his cows will shrink a quart each in milk; neither will the same amount of corn meal or wheat shorts given in place, keep them up to their full quantity; but after feeding cotton seed meal again for one or two days, they will come up again to their full rate. This may seem a strong statement, but it comes from a careful observer, and a reliable gentleman.

Analyses conducted at the Experiment Station in Connecticut, show that the average estimated value of cotton seed meal exceeds the cost by twenty-four per cent.; hence the use of it for feeding purposes is in the line of economy. A leading authority says:

"As a rule, a combination of wheat bran and oil-cake meal will accomplish more in maintaining a lot of closely-stabled breeding and growing cattle stock in a satisfactory condition, than any other two articles whatever. Bran, which was formerly supposed to be the mere refuse part, bearing a relation to the inner portion of the grain like that borne by the shell of the nut to the meat within, of about as much value as the straw upon which the grain



HOLSTEIN COW, "ZUIDER ZEE 9th."  
Property of Dexter Severy & Sons, Ireland, Ill.



grew, is found to contain no small portion of the constituents required by both growing and mature animals. The laxative tendency, objected to by some, depends upon mechanical action, and is readily modified by combining the finer descriptions of mill refuse with it, in proportions required by the habits of body of different animals in the herd.

Oil-cake meal, while having a laxative tendency if fed somewhat liberally, nevertheless is one of the best combinations with bran, when skillfully handled, as its mucilage and oil allays irritation of the mucous surface, and the constituents of these two articles, combined with good hay, take, perhaps, a wider range than any other two articles. Oats, of course, are always suitable for either young or aged stock; but in considering the claims which bran has upon our attention, economy cuts quite a figure. This, together with the fact that it is infinitely safer for breeding animals than corn meal, renders it one of the best aids in the feeding stable; provided, always, that it is seconded by other foods, according to the varying requirements mentioned as these occur from day to day. All farmers who occupy advanced ground — all breeders of improved stock are supposed to occupy this position — will bear in mind the manure pile. Bran is rich in phosphates, and these are of special value, to lands long in use, for crop-growing and grazing. There is no mistaking the effect upon pastures of manuring from a pile into which bran has entered through liberal feeding."

Ensilage has been fairly tested as an article of diet for dairy stock, and found to be excellent for this purpose, as will be seen by reference to the opinions and experiments from various authentic sources on that subject, in another department of this work.

In order to make the highest success in the dairy, good milkers should be selected for the purpose, the selection being made by the use of all the known tests of good milking stock. It is also quite as essential that the animals be healthy and of strong constitution. Having such animals for a basis of success, good care, including a variety of food in sufficient quantities, is absolutely necessary to obtain the highest results, and such a course will prove the most profitable and economic in the end. Cattle like a change of food as well as the human species, and it is quite as necessary for their health. It is highly important that the dairyman should study the qualities of different kinds of food and use good judgment in combining them. There are only comparatively a very few kinds of food that contain all the requisite elements in the right proportion, and if different foods are to be given, they should be so combined as to contain as far as possible the required elements in the proper proportion, which can be easily done by giving a little attention to the analysis of different articles of food.

A necessity for a sufficient quantity of food has already been shown, and does not require further notice in this connection. It should however be remembered that a milch cow requires not only enough food to repair the constant drain of the physical system, but also to furnish a sufficient material for the constant drain of milk production. The milk yield, whatever the breed, will be largely influenced by the kind and amount of food given.

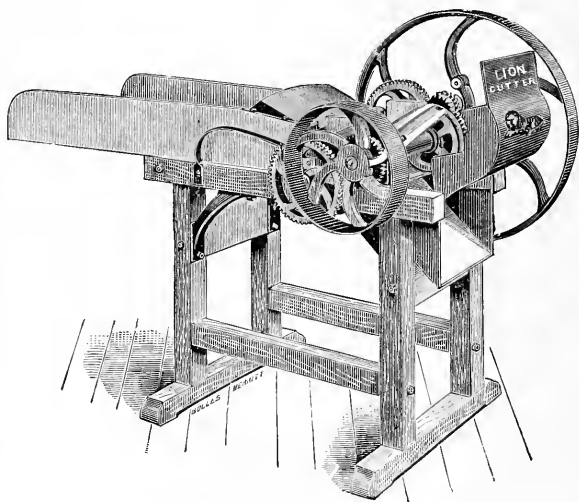
**Steaming Food for Cattle.**—There has been much discussion with regard to the comparative nutritive value of cooked and uncooked food for cattle, some claiming that the increased nutritive value resulting from cooking amply repays for the labor attending it; others holding to the opinion that the benefits derived do not compensate for the labor required. The cooking of food in sufficient quantities for cattle requires considerable labor, but where the farmer possesses the means of doing this readily, it may be accomplished with the expenditure of much less time and labor than would generally be supposed, and we are of the opinion that, under such circumstances, it is time and labor well invested.

Raspail says that starch is not actually nutritive to man until it has been boiled or cooked; the heat of the stomach not being sufficient to burst all the grains of the feculent mass which is subjected to the rapid action of this organ. The stomachs of graminivorous animals and birds seem to possess, in this respect, a particular power, for they use feculent

substances in a raw state. Nevertheless, recent experiments prove the advantage that results from boiling the potatoes and grain, and partially altered farina, which are given to them for food; for a large proportion, when given whole, in the raw state, passes through the intestine perfectly unaffected, as when swallowed.

Pereira expresses the following opinion: "To render starchy substances digestible, they require to be cooked, in order to break or crack the grains; for of the different lamina of which each grain consists, the outer ones are the most cohesive, and present the greatest resistance to the digestive power of the stomach, while the internal ones are least so."

It cannot be denied that heat, or the cooking power, aids largely in reducing roots, grains, and coarse fodder, such as hay, straw, etc., to a condition that renders them more easily digested, and their nutritive properties taken up by the system more readily and effect-



THE LION FEED CUTTER.

ually; besides, if food is taken into the stomach warm, there is no loss of heat in the animal economy in warming the mass. Many of the coarser articles of food can also be utilized that would otherwise not be eaten by cattle, as by this means they may be mixed with other food, and the whole be rendered palatable as well as digestible.

Mr. E. W. Stewart, who has had much experience in feeding steamed food, describes his process of steaming, etc., as follows:

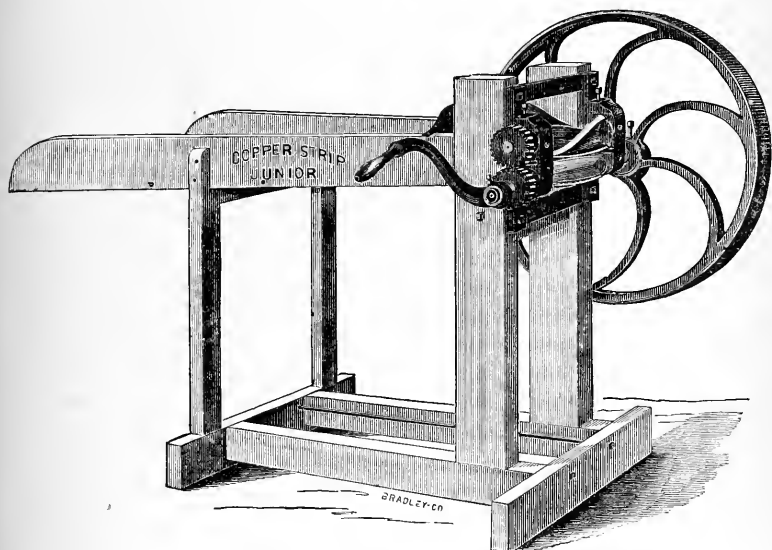
**Preparing Food for Steaming.**—"The feed is prepared for steaming thus: "The cut straw, hay and straw, roots, or other cut feed, sufficient to fill the steam box, is measured in a square six-bushel basket. It is then moistened by a four-gallon watering pot, with twenty gallons of water to fifty bushels of feed, while it is being stirred up with a fork. Then two quarts of wheat bran to the bushel of straw is mixed in the same manner, and a little salt added, when it is put into the steam box and steamed for an hour and a half. This feed will keep warm for two days in the coldest weather.

The reader will readily see the defect in this arrangement, as, with such a steam box, no considerable pressure can be obtained; hence it does not reduce the feed to such a pulp as is desirable. Yet it modifies and softens it very much. My boiler would safely bear a pressure of thirty pounds to the inch, and, with an iron steam box, the feed could as cheaply be put under that pressure, and reduced to such a pulp as is desirable, as it now is steamed in a wooden box.

For the benefit of those who wish to feed a large stock—one to two hundred head of cattle or more—we would suggest an arrangement which will save much labor, economize the material, and produce more uniform results.

A portable steam engine of five horse-power provided, we will arrange the animals, steam box, food, etc., as follows:

The stables are in the lower story, on each side of a feeding floor ten feet wide. It would be more convenient to have room behind each tier of animals, to pass a cart, or wagon,



GALE'S JUNIOR CUTTER.

to carry off the manure, than to throw it out at the side. A wooden track should be laid in the center of the feeding floor, on which to run the steam boxes. Two holding one hundred bushels each should be provided for one hundred cattle. One would be run under the upper floor to be filled and steamed, and then moved away for use; while the other could be run to the spot, filled and steamed. On the upper floor, the straw cutter would be placed, provided with a feeding apron to feed itself, with two bins overhead, one for cut hay or straw, the other for meal and bran. Elevators, to carry up the cut feed from the straw cutter to the feed bin, as fast as cut, would be necessary.

There would also be necessary a water pipe connected with a pump or an elevated reservoir, to furnish water to moisten the feed. A tank might be placed overhead and filled by a force pump. Then, in a scuttle through the floor, directly over the steam box, there will be

placed a cask or cylinder, three feet in diameter and five feet long, without a bottom, but a bar across the lower end, on which an upright revolving shaft will be set in the center, provided with six arms, just long enough to turn inside. This shaft will pass through a like cross-bar on the top, and extending above enough to receive a pulley of the proper size, to revolve it some six hundred times per minute. Now, a spout will extend from the elevated feed bin to the top of this cylinder, with a slide to open or shut it; also a spout extending from the meal or bran bin, so as to communicate in the same way with the cylinder, and a water-pipe, also, furnished with stop-cock and movable cover, will be placed on top of the cylinder. A belt will run from the engine to the pulley on top of this shaft. Now, when ready to fill the steam box, this shaft will be set in motion—the spout for cut feed will be opened so as to discharge a definite quantity, the spout for meal opened to discharge the proportion desired, and the water, so as to let in twenty gallons for fifty bushels of feed. It will be seen that the feed, and meal, and water, in passing through the cylinder, will come in contact with these swift moving arms on the shaft, and be thoroughly mixed, and fall into the steam box, ready for steaming. The feed should be pressed into the steam box, as more will be steamed, and better. With this arrangement, one expert man may cut and steam feed for one hundred head of cattle, and two men could easily care for two hundred. It will be seen that, with proper system and machinery, the expense of cutting and steaming for a large stock will be little more than in the ordinary way of feeding. This steam engine may be used to grind the grain, cut and steam the feed, and do all the work requiring stationary power on the farm. The engine should be placed as near the steam box and straw cutter as it can be with safety. A double spark extinguisher must be placed over the chimney to prevent fire."

**Results of Cooking Food.**—The same authority summarizes the results of cooking food as follows :

"1. It renders mouldy hay, straw, and cornstalks perfectly sweet and palatable. Animals seem to relish straw taken from a stack, which has been wet and badly damaged for ordinary use; and even in any condition, except 'dry rot,' steaming will restore its sweetness. When keeping a large stock, we have often purchased stacks of straw which would have been worthless for feeding, in the ordinary way, and have been able to detect no difference, after steaming, in the smell, or the relish with which it was eaten.

2. It diffuses the odor of the bran, corn meal, oil meal, carrots, or whatever is mixed with the food, through the whole mass; and thus it may be cheaply flavored to suit the animal.

3. It softens the tough fibre of the dry cornstalk, rye, straw, and other hard material, rendering it almost like green, succulent food, and easily masticated and digested by the animal.

4. It renders beans and peas agreeable food to horses, as well as other animals, and thus enables the feeder to combine more nitrogenous food in the diet of his animals.

5. It enables the feeder to turn everything raised into food for his stock, without lessening the value of his manure; indeed the manure made from steamed food decomposes more readily, and is therefore more valuable than when used in a fresh state. Manure made from steamed food is always ready for use, and is regarded by those who have used it as much more valuable for the same bulk than that made from uncooked food.

6. We have found it to cure incipient heaves in horses, and horses having a cough for several months at pasture have been cured in two weeks on steamed feed. It has a remarkable effect upon horses with a sudden cold, and in constipation. Horses fed upon it seem much less liable to disease; in fact in this respect it seems to have all the good qualities of grass, the natural food of animals.

7. It produces a marked difference in the appearance of the animal, at once causing the coat to become smooth and of a bright color, regulates the digestion, makes the animal more contented and satisfied, enables fattening stock to eat their food with less labor (and consequently requires less to keep up the animal heat), gives working animals time to eat all that is necessary for them in the intervals of labor; and this is of much importance, especially with horses. It also enables the feeder to fatten animals in one-third less time.

8. It saves at least one-third of the food. We have found two bushels of cut and cooked hay to satisfy cows as well as three bushels of uncooked hay; and the manure, in the case of the uncooked hay, contained much more fibrous matter, unutilized by the animal. This is more particularly the case with horses.

These have been the general results of our practice, and, we presume, do not materially differ from that of others who have given cooked food a fair trial."

George Geddes, in his writings on agricultural topics to the farmers of the country, says:

"I find if I take ten bushels of meal, and wet it in cold water, and feed twenty-five hogs with it, that they eat it well; but if I take the same and cook it, it will take the same number of hogs twice as long to eat it up, and I think they fatten quite as fast in the same length of time. By cooking you double the bulk."

S. H. Clay, of Kentucky, who has experimented carefully with both cooked and uncooked food, says:

"I fed two hogs on uncooked corn in thirty days, 405 pounds, and they gained 42 pounds; while two hogs fed on cooked corn meal for thirty days ate 270 pounds, and gained 80 pounds. The food was then reversed, and the two hogs that had previously had dry corn were fed on cooked meal. In twenty-six days the two hogs that were fed on dry food ate 364 pounds of shelled corn, and gained 44 pounds; while the two hogs fed on cooked meal ate, during the same time, only 234 pounds, and gained 74 pounds. Here it appears that a bushel of raw corn makes  $5\frac{3}{4}$  pounds of pork, while a bushel of cooked meal makes  $17\frac{1}{2}$  pounds."

Those who have made a fair trial of steaming coarse fodder have generally recommended the practice as being quite satisfactory in results, since by this means such fodder is rendered more nutritious, and much that would otherwise be wasted can be utilized. There can be no doubt but that grain, potatoes, etc., are much more nutritious cooked than eaten in a raw state, and the question for the farmer to determine for himself is whether the benefits derived from the use of cooked feed fully compensate for the additional labor attending the cooking process. Those who have tested it fully generally concur in the opinion that it does, and that the practice of both the cutting and cooking of food for cattle in the winter season lie in the direction of true economy and success.

**A Sufficient Supply of Pure Water for Milch Cows.**—It has been found that milk of an average good quality contains from eighty-three to eighty-seven per cent. of water. As a general rule, cows that give the largest quantity of milk will require the largest proportionate quantity of water. It is a fact apparent to all dairymen that cows have a largely-increased appetite for water after they commence giving milk, as compared with the demand for liquid when going dry. Dancel, in his communication to the French Academy of Sciences, reports the result of his experiments in inciting cows to drink large quantities of water. He states that by so doing the quantity of milk yielded by them was increased several quarts per day, without materially injuring its quality. He claims, in the same connection, that the quantity of milk obtained is approximately proportional to the amount of water drank by the animal. Cows which, when fed with dry fodder, gave only from nine to twelve quarts of milk per day, at once increased their yield to from twelve to fourteen quarts when their food was moistened by mixing it with from eighteen to twenty-three quarts of water per day. In the same connection, the cows were allowed to drink regularly, as before,

and their thirst was also a little excited by adding to their fodder daily a small quantity of salt. On a chemical examination of the milk thus produced, it was found to be of good quality, and excellent butter was made from it. He also says, with considerable emphasis, that a cow that does not habitually drink as much as twenty-seven quarts of water a day is actually and of necessity a poor milker, such cows yielding only from five and a half to seven quarts a day; but that all the cows he has seen that drank as much as fifty quarts of water each day were excellent milkers, yielding from nineteen to twenty-three quarts of milk daily. Of course the water required by the cow will depend somewhat upon the character of the food eaten, more water being necessary where dry fodder is given than where the food is moistened. Cows going from dry food to that which is green and succulent, always increase their flow of milk at once, while the yield is proportionately diminished in changing from green fodder to dry. There must, of course, be a judicious limit to the amount of water which a cow may drink, and no person of sound judgment could fail to see that by going to extreme measures in this respect the health of the animals would be impaired, as well as the quality of the milk they yield. Milch cows, as well as all other stock, should be allowed all the water they will drink, and if they can have free access to it so much the better; but it is highly essential that the water be *pure*. How can we expect animals to remain in a healthy condition, or the milk they produce to be of a pure and healthy nature, when the water they manufacture it from is that of stagnant pools, or such as is made putrid by other means? Such milk cannot, in the nature of things, be pure. It is poisonous, contains the elements of disease, and is no more fit to be drank by mankind than the water from such sources. Farmers, as a general practice, are too indifferent or careless with respect to this matter. Where there is not an abundance of pure water from springs and streams on the farm that may be utilized, or if these fail in certain seasons, the difficulty can be easily obviated by the use of wind power for raising water from wells, or by other means, directions for which have been given in a previous department of this work, on "Water Supply of the Farm." Health, as well as economy, require that all stock, and particularly dairy stock, should be supplied with an abundance of pure water.

**Shade in Pastures.**—While we are aware that many graziers and some dairymen hold different opinions regarding the advantages and disadvantages of shade in the pasture, and while we are perfectly aware of the fact that grass grown in the sunshine is sweetest and best, and would therefore not argue in favor of having what might be called a shady pasture, still we confidently believe in having shady spots here and there in all pastures, and urge upon farmers the necessity of providing for such shade in pastures,—where it is not already provided,—at the earliest possible moment. In the extreme mid-day heat of summer, both men and beasts naturally seek a cool retreat. The shade of a leafy tree under such circumstances comforts and refreshes both men and the lower animals, like a draught of cool water; and animals need the one for comfort, and we might say, health, as much as the other.

There is scarcely a more agreeable scene to be found, by a person of rural taste, than that of cattle standing or lying in picturesque groups, "chewing the cud," a picture of comfort and content, under nature's great umbrella,—a majestic tree, or standing knee-deep in some running brook, with trees in foliage on either bank. Cattle under such circumstances will feed in the early morning or in the evening when the herbage is fresh and sweet from the effect of the dew, and we believe will thrive much better, than stock compelled to remain all day in the hot and burning sun, to say nothing of the comfort thereby obtained. On humane considerations alone, aside from benefits to be derived, all animals should be supplied with retreats of shade from the hot sun.

Where pastures are bare of trees, temporary sheds can be provided, until trees that may be set out will have time to grow sufficient to answer the purpose. There are many varieties

of fast-growing trees, that will in a few years be able to cast quite an area of shade. The best pasturage for milch cows is that afforded by good, old grass lands, in enclosures supplied with shade, and where there is a constant supply of pure water. The best grass for dairy produce is that which is so stocked as to keep it always fresh, green, and sweet. This is most easily secured by having small enclosures and frequently changing the cows from one field to another, thus giving each pasture rest and recuperation as needed. Should the season be dry, and the pasture fail, then recourse must be had to soiling. A prudent forethought will provide for such an exigency. What is desired, is a variety of grasses springing up in succession, and that will bear cropping, by which means fresh pasturage can be had from May until late in the autumn.

**Kind Treatment of Cows.**—The money value of quietness, gentleness, and good temper in milch stock, is well known and appreciated by all practical farmers as a thing of prime importance; however, in buying or breeding stock, they are quite too apt to overlook these characteristics,—qualities which to a certain extent are inherited from the parents, the same as a disposition to fatten, quality of flesh, yield of milk, etc. An experience of many years has taught us that kindness has a winning and gentling influence on all animals. We have seen many heifers literally ruined by harsh and improper treatment. Even harsh tones, to a nervous and naturally timid animal, are almost as abusive as blows and kicks, and no man guilty of either should ever be allowed the care of cows. Gentle treatment should commence early with the young calf, by frequent handling, feeding, and petting them from day to day, and be continued until and after reaching the dairy.

The calf should never know what it is to fear man; and if never treated harshly, frightened or teased, will, almost without exception, be exempt from vicious habits. We like to see milch cows, and, in fact all animals on the farm, so gentle and devoid of fear of man, that their manner clearly indicates that they seem to regard man as their friend and protector,—stock that can be approached at any time in the pasture or stall, without showing fear of being approached or handled. Such animals can not only be taken care of with less labor than otherwise, but are really more valuable as far as the results are concerned. It is not only of great importance that the dairy stock should be of the best quality, but that it should have good and kind care as well; even the best dairy breeds may be rendered inferior, or comparatively worthless, by improper feeding, and cruel treatment.

**Thoroughbred and Native Cows Compared.**—As illustrating the difference between thoroughbred and native cows, and the greater profit arising from using the former in the dairy rather than our native cows, we propose to give some pertinent facts from "Wauashakum Farm," Framingham, Mass., owned by E. L. Sturtevant, at present Director of the New York Experiment Station. The following statement is made after six years of methodical management, in which time the milk of each cow was weighed morning and evening, an accurate account being kept meanwhile of all the food consumed, both as to quantity and cost.

For the first three years the herd of cows was composed of the best natives that could be found in New England; a standing offer of \$100 for any cow that would milk twenty quarts a day, bringing the choicest animals from the country for miles around. It will be observed therefore that the native cows owned and tested by the Messrs. Sturtevant for the first three years were what would be called a choice herd, though of no particular breed.

The following are some of the results as given by Dr. Sturtevant in a recent lecture:

|  | Av. No. cows. | Average yield per cow.         |
|--|---------------|--------------------------------|
| "First year, . . . . .                         | 35.7          | 5,678 pounds, or 2,160 quarts. |
| Second year, . . . . .                         | 36.3          | 4,837 pounds, or 2,229 quarts. |
| Third year, . . . . .                          | 27.4          | 4,015 pounds, or 1,850 quarts. |
| Average number cows for three years, . . . . . | 33.1          | Av. yield per cow 2,079 quarts |

During this time we fed on the average to each cow, each year, 351 pounds shorts, 90 pounds linseed meal, 150 pounds rice meal,  $879\frac{2}{3}$  pounds corn meal, at a cost of over thirty dollars per cow. I will say here that cows that will give twenty quarts a day are rare in New England. We hear of them often; each farmer claims his share. But unfortunately, when put to the test of measure, some exceptional circumstance is the excuse of the owner for the cow not fulfilling his promise. Yet, cows that will give twenty quarts for a few days are found, but those which will continue this flow for any length of time are extremely scarce. If any farmer thinks he has such, let him measure her milk for a few days before he speaks of it. The heaviest milker we have had during these three years of natives, gave for one year 3,703 quarts, but the next year she only gave 1,659 quarts. The heaviest milker for the three consecutive years gave 2,963 quarts, 2,952 quarts, and 2,098 quarts—average 2,672 quarts. Never did we obtain forty pounds a day but with one cow during these three years, and she gave forty-two and one-half pounds once, forty-two pounds once, forty-one pounds twice, forty and one-half pounds once, and forty pounds eight times. It will be remembered that forty-two and one-half pounds is but nineteen and one-half quarts. I am not now stating what can or what cannot be produced by any one in *his* herd; I only give the records of our herd.

After having tested a few Ayrshires in our barn, we crossed the ocean in order to examine improved dairy breeds in their own home, and if we found them of sufficient merit, to bring over to our farm the best we could obtain. After viewing carefully the stock among the best farms in Ayrshire, we were thoroughly convinced of the value of this breed for our husbandry; and not only did the best specimens of cows show value, but the high average quality of those we met with on each farm gave a most favorable opinion of their worth. We therefore imported a lot, and these few, with others purchased in this country, comprise the herd whose statistics we give.

|                               | Av. No. cows. | Average yield per cow.         |
|-------------------------------|---------------|--------------------------------|
| In the fourth year, . . . . . | 19.8          | 5,678 pounds, or 2,616 quarts. |
| In the fifth " . . . . .      | 18.7          | 4,990 pounds, or 2,300 quarts. |
| In the sixth " . . . . .      | 13.3          | 6,221 pounds, or 2,866 quarts. |

Average number of Ayrshire cows for three years, seventeen and two-thirds; average yield, 2,594 quarts.

During these three years we averaged two and five-tenths bulls and eight young stock per year, for now we had a breeding herd. By bulls I mean animals in service, and by young stock I refer to animals not calves of the present year, and not yet in milk or use. I think it will be fair in estimating the feed to call two bulls and three head of young stock to require the feed of a cow.

During these three years we carried to the barn on an average each year per cow, shorts, 412 pounds; corn meal, 1,038 pounds; linseed meal, 98.2 pounds; cotton seed meal, 107.6 pounds; malt screenings, 85.6 pounds. This represents a value of twenty-seven dollars and fifty cents per cow, at the same valuation as in the former case. . . . .

The largest yield in any one of these three years from the Ayrshires was 3,961 quarts. The next year the same cow gave 3,288 quarts. The largest average of the same cow for three consecutive years was 3,160 quarts."

"During this time we had among the Ayrshires sixty-seven yields of forty pounds and over, as follows:

|                                       |                                       |
|---------------------------------------|---------------------------------------|
| Eleven yields of . . . . . 40 pounds. | Twenty yields of . . . . . 41 pounds. |
| Nine yields of . . . . . 42 pounds.   | Nine yields of . . . . . 43 pounds.   |
| Six yields of . . . . . 44 pounds.    | Three yields of . . . . . 45 pounds.  |
| Two yields of . . . . . 46 pounds.    | Five yields of . . . . . 47 pounds.   |
| One yield of . . . . . 50 pounds.     | One yield of . . . . . 51 pounds.     |

Again, selecting six cows each year from the number kept during the whole year, and such represent the best milkers, we have —

|   |   |   |   |   |               |
|---|---|---|---|---|---------------|
| In first year, twenty-five native cows, the six best, gave  | . | . | . | . | 2,919 quarts. |
| In second year, twenty-five native cows, the six best, gave | . | . | . | . | 3,047 quarts. |
| In third year, sixteen native cows, the six best, gave      | . | . | . | . | 2,562 quarts. |

Average of twenty-two cows to select from; the six best in the average of three years, 2,842 quarts.

|   |   |   |   |   |               |
|---|---|---|---|---|---------------|
| In fourth year, thirteen Ayrshire cows, the six best, gave    | . | . | . | . | 2,169 quarts. |
| In the fifth year, fourteen Ayrshire cows, the six best, gave | . | . | . | . | 2,747 quarts. |
| In the sixth year, thirteen Ayrshire cows, the six best, gave | . | . | . | . | 3,186 quarts. |

Average thirteen and three-tenths cows to select from; the six best in the average of three years, 3,034 quarts.

As a matter of fact in obtaining these results we selected from thirty-five different native cows and seventeen different Ayrshire cows.

It will also be instructive to compare the records of the same natives kept during three years with the Ayrshires under similar circumstances.

Of the eight native cows retained through the three years, from a high opinion of their worth, I present the following figures:

|               | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. | No. 8. |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| First year,   | 6,416  | 5,524  | 3,796  | 5,408  | 5,735  | 1,735  | 5,866  | 1,780  |
| Second year,  | 4,554  | 4,601  | 4,846  | 4,079  | 4,192  | 7,055  | 4,457  | 8,037  |
| Third year,   | 6,431  | 4,140  | 3,112  | 3,790  | 4,750  | 5,144  | 4,577  | 3,601  |
| Average lbs., | 5,800  | 4,755  | 3,918  | 4,435  | 4,892  | 4,644  | 4,966  | 4,439  |
| Average qts., | 2,673  | 2,191  | 1,805  | 2,039  | 2,254  | 2,140  | 2,288  | 2,045  |

Of an average of 2,179 quarts yearly.

Or the ten Ayrshires retained through three years, we have —

|               | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. | No. 8. | No. 9. | No. 10. |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Fourth year,  | 5,912  | 6,264  | 7,176  | 3,086  | 6,348  | 6,305  | 6,578  | 6,220  | 8,596  | 5,740   |
| Fifth year,   | 5,429  | 5,050  | 5,854  | 3,639  | 6,179  | 5,147  | 5,730  | 5,149  | 7,135  | 5,067   |
| Sixth year,   | 7,293  | 5,656  | 5,636  | 4,213  | 5,571  | 6,299  | 5,675  | 6,525  | 4,846  | 5,532   |
| Average lbs., | 6,214  | 5,656  | 6,222  | 3,646  | 6,030  | 5,917  | 5,994  | 5,964  | 6,859  | 5,446   |
| Average qts., | 2,823  | 2,606  | 2,867  | 1,680  | 2,779  | 2,726  | 2,762  | 2,748  | 3,160  | 2,508   |

Or an average of 2,666 quarts.

These figures show conclusively that the best cow in the barn one year is not necessarily so the next, and that a farmer can give his average yield for one year, and not necessarily give the milking average, or average profit of the dairy on his farm."

From the above it will be seen that with the same expense in feeding, there is a credit to the Ayrshire of 500 quarts per head, as a common difference between the amount of milk rendered by the pure-bred Ayrshire per year, and the best native cows respectively. With a herd of twenty cows, such a difference as ten thousand quarts of good milk from having an improved breed is quite an item. By comparing the average yield of the best native cows, as above given, with that of other pure-bred dairy stock, as given in connection with the description, etc., of the pure-bred dairy breeds, the difference will be found equally striking.

The foregoing facts and figures, coming from such unquestionable sources, should be conclusive evidence as to the benefits resulting from the use of improved breeds in the dairy. If our dairy farmers would use only thoroughbred bulls of the Jersey, Holstein, Ayrshire, or some other approved milk breed—selecting a bull for such use that has a good "escutcheon," with other attending milk points, they by such use, would soon possess improved herds of grade cows, and by continued use of such thoroughbred bulls, for a few years at a trifling cost, would be the owners of herds nearly as valuable as the pure-breeds.

**A Device for a Self-Sucking Cow.**—It is not uncommon for cows to form the habit of drawing their own milk—a habit which is difficult to break up—and, unless it can be prevented by some device, will render the animal worthless, as far as milk-production is concerned. There are many simple devices to prevent this practice that the ingenuity of the farmer might suggest. The two following have proved quite effectual for this purpose: An ordinary headstall is put on the cow, with a ring under the chin; a surcingle is then put around the body of the cow, just behind the shoulders, with a ring underneath. Then attach a stout bar of hard wood (not large or heavy) at either end to both rings, so that it will reach from the ring under the chin to the ring in the surcingle, leaving three or four inches of perpendicular length in a strap or light chain between the ring under the chin and the end of the stick to which it is attached. This will not interfere with the animal's feeding or drinking, but will prevent her reaching her nose to her udder. Another device is thus described by a farmer who has found it very useful:

“Cut a piece of tug from an old harness, of sufficient length to go around the cow's nose, about three inches above her mouth. Split the tug out upon one side for about eight inches, and drive wrought nails so that the heads will rest against the inner surface of the other half of the tug. By means of a strap, which passes over the cow's head, this barbed tug will be secured to the bridge of her nose. The moment she attempts to draw her milk the points of the nails will come in contact with her udder, and thus be a complete preventive.”

**Driving Cows from Pasture.**—Cows that are worried by dogs in being driven from the pasture, or whipped, shouted at, and hurried by a thoughtless and brutal driver, are in no condition to yield milk of the best quality or quantity. They should always be driven quietly, and never faster than a walk. With their udders distended with milk, as those of good milkers would necessarily be, it would cause discomfort and pain to be obliged to go faster than a walk; besides, by hurrying cows under such circumstances, especially in warm weather, there will be a liability of their blood and milk becoming overheated, and such milk is not only unfit for use, but it will injure other milk with which it comes in contact.

Let the cows always be driven quietly and at an ordinary walking gait to pasture and from it, if you wish to obtain the best quality of milk, and also keep the cows gentle and quiet; for even with all the other essentials of success in dairying, if this rule be ignored, the best results cannot be attained. First-class dairy products cannot be made from diseased milk. Farmers and dairymen generally are too careless and indifferent in this respect, and permit their cows to be dogged and hurried from the pasture to the milking yard without the least thought of the injury that will inevitably result from such a practice.

**Milking, etc.**—The following on milking, from Willard's Practical Dairy Husbandry, is so much in accordance with our own views that we quote it verbatim:

“Farmers generally have the impression that when milch cows have wintered well and are fairly out to grass there need be but little care or attention given to animals, and that then in their herds they have a fountain that is to supply good, pure milk simply by drawing it, not much matter *how* or *when*.

It is true, people understand that where cows are milked with great irregularity, or are subjected to any extraordinary brutal treatment—such as sundry kicks in the udder with a heavy boot—they will yield unprofitable results, since the consequence of such management forces itself almost immediately upon the attention. But it is not those things that come so plainly under the eye of the observer, concerning which I propose to speak. If an angry man kicks his cow in the udder, some of the blood-vessels of the part will probably be ruptured, and the bloody milk which flows from the teats will speak more forcibly than any words of mine; but if he kicks her in the ribs, or mauls her with a milking-stool upon the hips and back, the consequences may not be so immediately apparent, yet that damage is

done and that loss will follow is equally certain. I am speaking of no exceptional cases, but of those that are of common occurrence wherever any considerable herd is kept, and where the eye of the master is not sharp to detect and punish these offences. The pressing want in the dairy districts to-day is for good, kind, humane laborers, who can be trusted to do the milking in a proper manner. Many of these people do not understand that any particular loss is to follow from a moderately brutal and cruel treatment of cattle.

I have always advised dairymen to make a special contract with laborers who are to be employed about the dairy. Let it be understood that the moment a cow is maltreated that moment a settlement is to be made, and the party offending to be discharged, with a reasonable deduction from his wages. This, fairly understood at the time of hiring, together with proper oversight of the animals, and those about the dairy, will go far to mitigate a great and growing evil. It is a lamentable fact that there are a large number of ailing milch cows in the dairy districts—cows that are not in vigorous health, that fall off in milk, that have sick turns now and then—which, if the history of their treatment was known, could all be traced to the causes I have enumerated. A rap upon the spine with the stool has ruined many a valuable beast; a stroke upon the udder has often produced unaccountable cases of garget.

I wish it could be generally and thoroughly understood that nothing pays better in the dairy than kindness and gentleness to stock. Milch cows should be kept as quiet and comfortable as possible, and no person should be employed in milking that the animals fear. Any undue nervous excitement not only lessens the quantity, but depreciates the quality of the milk. Sometimes cows take a dislike to their milker, and in such cases a change should be made, otherwise there is a liability of the cow falling off in her milk. I have seen several cases of this kind, and although such freaks are unaccountable it will always be found better to change the milker if possible, rather than to attempt to conquer this peculiarity. I do not approve the practice, common with some dairymen, of the milkers milking the cows indiscriminately. The hands should each select a certain number of cows, and continue to milk them from day to day throughout the season.

The hours of milking should be regular, and each cow should be milked in regular order. The milk should be drawn rapidly and to the last drop, and all loud talking, singing, and wrangling avoided. These are little things in themselves, and may seem to many to be 'over nice;' but repeated and well-conducted experiments have convinced me that they are important points to be attended to, and must be observed to obtain the best results."

The manner of milking exerts a great influence on the yield. A slow and careless milker will soon dry up the best cow. The milk should be rapidly drawn, and the last drop obtained, as that which is left becomes reabsorbed into the system, or becomes hardened in the udder, and diminishes the tendency to secrete a full quantity afterwards. Harshness in pulling and drawing upon the teat in milking should be avoided. Many cases of garget are, without doubt, caused by this practice. In milking, the teat should be clasped and the milk squeezed out by the pressure, or the ends of the fingers may be pressed upon the milk duct in such a manner as to force out the milk, a slightly upward movement or lift being given to the udder previous to the pressure. The nails of the milker should always be cut short, to avoid injury to the teat.

Much has been said and written respecting the milkmaids of Holland, and the benefits resulting from their gentle treatment of the cows under their charge. The *London Grocer* gives an exceedingly picturesque description of them in their attendance upon the large black and spotted cows that are kept in stables scrubbed so clean as to be in contrast with many carelessly-kept kitchens. It is stated that the health of these great, shining cows is guarded with such care that it is not uncommon to see their feet covered with leather shoes when taken to pastures where the soil is damp, to prevent them from contracting a disease of the feet. In winter they are protected from the cold by cotton blankets.

"Milkmaids of the rosiest complexion attend them to the fields, and treat them so gently that their tempers are never ruffled. Holland is a modern Arcadia of pastoral happiness. Perhaps it is to be regretted that we have lost our ruddy race of milkmaids, whose gentle ways made gentle cows, and have substituted the masculine help with his club, or sent the boisterous dog to worry them home. The milkmaid should still be found, even in this free and gallant country, plying the art which she so deftly executes. There is no more impropriety in a woman milking a cow than in feeding chickens; and if women had the training of cows, there would seldom be a vicious one. If we could teach the men who milk our cows to treat them as kindly as the Holland milkmaids do, it would make a great difference, not only in quantity, but in quality of milk. Excitement has a serious effect upon the quality of milk. The milk of a single cow worried by a dog has been known to spoil a curd of cheese from twenty cows."

**Study the Disposition of Cows.**—It is highly essential that the milker should understand the disposition of the cows under his especial management. Mr. Willard, the authority previously quoted, says:

"I always insist that the milker study the disposition of the cows under his charge; that he become familiar or acquainted with each animal, patting them, or in other ways making them understand that he is friendly and fond of them. When once their confidence has been obtained in this way they will exhibit affection in return, and will yield in the increased quantity of milk more than enough to pay for the time and trouble given to the purpose indicated. Some cows are extremely nervous and excitable; such require caution and attention in management, otherwise they soon become worthless for the dairy."

**Cleanliness Essential.**—Some people are in the habit, when first sitting down to milk, of drawing a little milk to wet their hands and the teats of the cow. It is not a cleanly practice, and should always be avoided. I have seen milkers with their hands gummed up with filth, and the reeking compound of milk, dirt, and manure oozing out from between the fingers and dropping into the pail, as the result of this bad habit referred to. In some dairies a great deal of milk is tainted in this way, and not unfrequently this taint shows itself in a very marked degree in the butter and cheese manufactured. Many thoughtless persons have the impression that milk in some way purifies itself, and that taints imparted in the way I have named cannot be carried into the butter and cheese. Such ideas are very erroneous, and the sooner correct notions are had in regard to the purity and cleanliness of milk for dairy purposes the sooner shall we arrive at a higher standard of excellence in dairy products, and, as a consequence, better prices be obtained.

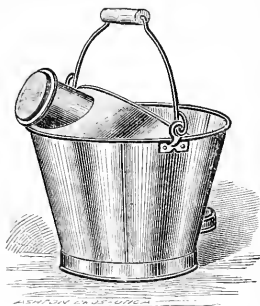
Cows do not milk any easier with wet hands than with dry hands. If the udder or teats are muddy or covered with filth, they should be washed with clean water and wiped dry. Then milk with dry hands, and it will soon be found easier and pleasanter, even with those who have been accustomed to wetting the hands and teats while milking. In summer, when cows are running upon clean upland pastures, the udder and teats will generally be clean, except perhaps in wet weather. If there is no occasion to wash the udder and teats, it is always well to brush over the parts with the hands or with a cloth, to remove any particles of dust or loose hairs adhering, and then set the pail in position and commence to milk with dry hands. Uncleanliness in milking is one of the great faults in the dairies of this country, and it is one of the causes of bad flavor in dairy products. Every dairyman should fully explain this matter to hired help, and insist upon cleanly habits in milking. That the fault referred to is a serious one and more general than some would at first imagine, can very easily be demonstrated by visiting any of the factories at the time the milk is being delivered. Let the milk strainers then be closely scrutinized, and they will often be found to present a most disgustingly filthy appearance. If this mass of filth could be shown to some uncleanly milkers, I hardly think they would be willing to test milk filtered through such material."

Sore teats are more frequently caused by the uncleanness of the milker, and leaving the teats wet after the milking, than from any other cause. This makes them chap and crack, rendering the milking process a painful one to the poor animal. For the treatment of sore teats, see **CHAPPED TEATS**, in the department of diseases of cattle.

Various kinds of milk pails have been invented, all of which possess more or less merit. The Perfect Pail, of which we give an illustration, is one of the best we have seen, since it combines pail, milk stool, and strainer all in one. It cannot be kicked over nor knocked over



THE PERFECT MILK PAIL.



DODGE'S TRIPLE STRAINER.

by the cow. The pail is made of the best tin plate, will bear weight of 300 lbs. or over, holds fourteen quarts; its cover makes a seat for the milker; the funnel which receives the milk is supported by a rubber tube which returns it to its position if moved by kicks or blows from the cow. A strainer is placed in the lower end of the tube. Any impurity falling upon or into the funnel can at once be removed and the funnel or the strainer cleansed if necessary, by a stripping of milk.

The Dodge Strainer consists of a series of three strainers put into the cap resting upon its internal ring, the cap being secured down tight upon the permanent ring, the intersections forming an irregular passage for the milk.

**Teat Tubes and Milking Machines.**—These are a nuisance on the farm, and should never be tolerated, except perhaps it may be the former\*in rare instances, when the teats of the cow are so sore, from cowpox or other cause, as to render the drawing of the milk by this means a necessity for a few days. We have never yet seen a milking machine that has been invented that was not without serious objections, and we know that many valuable cows have been ruined for milking purposes by their use. The only milking machine that should be utilized in the cattle yard is a clean, quiet, gentle, intelligent man or woman, who, knowing how to milk, and always milking the same cow or cows, can draw the milk in the best and therefore easiest manner, and in the shortest time.

**Milk Houses.**—A good, cool, well ventilated milk house is one of the essentials of a well regulated dairy. Such a house may be made of wood, stone, or brick, and if properly constructed, the kind of material is not essential. Some prefer a wood house to stone or brick, as the former will better retain an even temperature. A leading authority on dairying says of such a milk house:

“A frame house must be well constructed, otherwise it will soon begin to decay at the foundation, and this will at once destroy its usefulness. The frame house should be supported upon brick foundations, and if the soil is suitable the foundation should be sunk at least four feet below the surface.

The foundation should be of brick or stone, and carried up sufficiently to preserve the timber from decay; the floor covered with hydraulic cement concrete three inches thick, and finished with a light coat of clear cement and sand in equal parts. The windows should be on the north side, and protected by a wire gauze screen against flies. A space of two feet should be left above the ceiling, and through this a ventilator be passed, which is closed by a trap door that can be raised by means of a cord reaching down below. The walls and ceilings should be plastered, and a hard-finishing coat of plaster of Paris, costing only a few dollars extra, will add much to the cleanliness. Lime wash will be always peeling off and the scales will fall down upon the milk occasionally. The hard finish is less porous than the lime, which is an advantage.

A brick, stone, or concrete milk house will be preferable where the material can be procured easily; stone or concrete will be the cheapest where the stone or gravel is abundant, and either is better than brick both for winter or summer use. If the walls are lined inside by means of furring strips four inches thick, upon which the laths are nailed, a considerable air space will be secured, and this will help greatly to preserve an even temperature in the house. The outside of the milk house should be painted or washed white, as this reflects the heat and keeps the inside much cooler than bare bricks, stone, or boards would.

For a butter dairy a churning-room will be required, and this room should be provided with a sink and water for washing pans and utensils. To secure drainage the floor should be raised at least a foot above the level of the ground, and the surface outside should be graded up to the door-step, which should not be raised more than seven inches. It is very inconvenient to have steps up to a dairy, because in winter these are slippery with snow and ice, and it is a severe tax on any person to carry heavy pails up a number of steps. The sink in the churning room should be provided with a pump from a cistern or well close by; a cistern is the best because it will receive the water from the roof and keep the ground dry about the foundation.

A drain should be provided in the corner of the sink. Above the sink some racks may be made to hold spare milk pans, pails, etc. The milk-room is reached by a few board steps, with a rise of not more than seven inches each. The shelves are ranged around the sides, and a wide, low table is in the middle for the cream jars and to do the skimming upon. If deep setting is practiced, less room will be required. But it will always be well to estimate for the largest possible amount of space and room in a dairy, and then make it still a little larger. In my experience in planning dairies for myself and others, I have never yet found one too large, but many that have soon proved too small."

That well known writer, Mr. Henry Stewart, gives an excellent plan for a milk house which may prove of value to many dairymen contemplating building one—it is as follows:

"If the first requisite of good butter is the cow, the second is the dairy-room or house, for it is useless to produce good milk if it is spoiled in the keeping. A dairy-room should have an even temperature, and in the winter may be kept at about 45 to 50 degrees. One that is partly underground and has an apartment over it for churning and washing pans, etc., is preferable, as it will need no artificial heating by a stove. I prefer one with brick walls, whitewashed with lime, plastered overhead, and with a cement or flag-stone floor; that has the windows above ground and facing the south and west; the windows covered with fine wire gauze outside and hinged at the top, so that they may be opened by raising and hooking up the sash. The window, being close to the ceiling, ventilates the room completely.

My own aim in a dairy house is a building having a brick basement in a hill-side, with ice-house in the rear, having a chute on the bank through which to put in ice; and the milk room in the front, with porch for airing the cans and pails. Over the milk-room shall be the churning and washing room, provided with water heater, and with an elevator for passing cream and butter up and down, and stairs leading below; also a sink with taps from a tank

above. Over the milk-room shall be a tank supplied from a well, by a wind-mill overtopping the whole. From the tank water may flow through a pipe into the rooms below, for use in washing pans or supplying water in case the submerged-can system of settling the milk might be used at any time. A sink and drain may also be carried from the milk-room. The tank will be high enough to supply the house and the barn with water through pipes. The cost of the whole I estimate to be about \$600 for a dairy of fifty cows, and no one can doubt that it will be a profitable investment for the maker of extra butter."

Every milk house should be provided with good ventilation, in order to keep the milk sweet and from becoming contaminated with taints and odors. Where milk houses are not provided, the common practice in family dairies is to keep the milk in cellars, as that is the most convenient receptacle for it. When the cellar is used for this purpose, it should be kept absolutely clean and free from dampness and all foul odors. The floor should be made of cement, the walls closely painted and whitewashed, and a sufficient number of windows provided to afford a moderate amount of light. The windows should be covered with fine wire gauze to keep out the flies, and a slatted door, also covered with the same, be provided on the north side. The ceiling overhead should be lathed and plastered to prevent the dust from dropping down from the rooms above.

Ventilation may be secured by means of a tube or spout from the floor to the ceiling and through the wall, thus connecting with the air outside. This should also be protected by a fine wire gauze. This outlet should be divided in the middle, and one-half communicate with the spout which reaches to the bottom of the cellar, through which the fresh, cool air from outside may find an entrance, and the other half be connected with a short upright spout outside, through which the warm, foul air may escape.

These spouts should be provided with slides, so that they may be closed when necessary. By this means a cellar may be kept well ventilated, for the cold air coming in from the outside at the bottom, is dryer than the warm air of the cellar which passes out at the top, so that the moisture from the cellar is constantly being absorbed and carried off as long as the warm air flows out of the upper spout or opening.

**Dampness in Milk Cellars.**—If a cellar is so damp that the above method of ventilating does not entirely remedy the evil, the air may be dried by keeping a peck of fresh lime in the cellar, placed in a box or tube and exposed to the air. Twenty pounds of lime (or one peck) will absorb about seven pounds of water, and this amount of moisture taken from the air of a cellar will make quite a difference in drying it. The lime thus slacked will fall to a powder, and may be used for other purposes.

**The Use of Ice in Dairies.**—One of the first requisites of a milk house, or the dairy room, is a cool, even temperature; and this cannot be maintained in warm weather without ice. One of the modern improvements in butter-making, and the one that has been most effectual in raising the quality of butter, is the use of ice. It is indispensable to the highest success in any dairy, large or small, and when once the conditions are understood by which its consumption may be regulated economically, so that needless waste may not occur, its use will prove one of the economies of the dairy, not only in the larger quantity of butter produced from the milk, but in the higher price the improved quality of the butter will command.

Where a proper temperature is not maintained during the warm weather, much cream is wasted by the cream souring before it is all raised; and not only this, but the cream taken from such milk will be of an inferior quality, and will consequently produce an inferior grade of butter. Mr. H. Stewart, previously quoted, says respecting this subject:

"The most economic use of ice is when it is applied directly to the cooling of the milk alone, and is not wasted in cooling the surrounding air or the readily conducting walls of ill-

adapted vessels or receptacles for the milk. Probably the most convenient manner of using it is in a non-conducting refrigerator, closet, or tank. In using these it will be well to remember that when once the water or the air in the tank, or closet, and the substance itself of these, have been cooled to the lowest degree, the greatest economy consists in preserving the low temperature by keeping up a supply of ice. The loss of ice by conduction from a well constructed closed refrigerator is very small; but if this is left open when not in use, a considerable quantity of ice will be required to cool it down again, and this waste is loss. One pound of ice will cool one pound of water of 174 degrees to a temperature of 32 degrees. In other words, one pound of ice in melting absorbs 142 degrees of heat. This is known as the measure of the latent heat of water at 32 degrees, and which must all be given off to the atmosphere before the water can become completely changed to ice. It may be said, then, that water absorbs cold, which is the same thing practically as giving out heat; and this result may often be turned to good account in milk rooms or dairies in cold weather, to prevent the milk from freezing, by putting a tub of warm water into the dairy. The water will freeze before anything else, and in freezing actually warms the air and contents of the dairy, or rather, in reality, takes up all the cold in excess of 32 degrees, until it is frozen.

One pound of ice, therefore, in melting, will absorb sufficient heat to reduce four pounds of milk from 80 to 45 degrees; and if a good refrigerator is used, there will be little loss of ice in overcoming the water from the cooler. The quantity of ice to be provided may therefore be readily calculated, by considering that every pound melted will take 142 degrees of heat from a pound of milk; 71 degrees from two pounds; 47 degrees from three pounds; 36 degrees from four pounds; or 18 degrees from eight pounds. If therefore the milk is first set in cold spring or well water, and reduced down to 80 degrees, one pound of ice will then be able to reduce nearly 10 pounds of it to a still lower and perfectly safe temperature of 45 degrees. At this temperature the cream may all be raised from milk in twelve hours, and milk may be kept sweet for seventy-two hours or longer.

An ice house and a supply of ice will be found indispensable to every well conducted dairy, from a one-cow establishment up. The supply of ice may be procured without difficulty by throwing a low dam across a small stream, and collecting the water in a pond, or by excavating a pond, where there are no other means of getting it. A cubic foot of ice weighs about 55 pounds, or one-ninth less than water. A surface of less than 80 square feet of ice six inches thick will yield a ton, and a pond of a quarter of an acre will therefore give 136 tons with ice of this thickness only. The ice house and dairy should be contiguous and yet separate."

The cream should be obtained from the milk while it is sweet, and in order to secure this object, ice is essential in warm weather, which, with the requisite conveniences for the purpose, such as may be found in some of the improved creamers adapted to the modern system of deep setting, etc., a uniform quality can be secured, and as good butter be made in August as in June, providing the feed be of equal quality.

**Taints and Odors in Milk.** — One of the reasons why we prefer deep setting to shallow setting of milk, is because less milk surface is exposed to the air by the former method than the latter; for unless the air that comes in contact with the milk is perfectly pure, the milk will be liable to absorb any impurity it contains, and acquire taints that will affect the quality of the butter. There is no article of food so susceptible to odors, and so easily contaminated by surrounding impurities as milk. In fact, it affords one of the most fertile fields for developing and multiplying the seeds of fungus plants, which to a greater or less extent are always found floating in the atmosphere, and if this fact were more generally known, there would be more caution exercised on the part of every dairyman with reference to the quality of the air which is permitted to come in contact with milk.

It should be remembered, also, that milk not only absorbs spores that quickly produce acidity, but it also absorbs from the atmosphere spores of every other kind as well. Nor does this characteristic of milk stop with absorbing living germs, for it takes in every odor as well as the seeds of every ferment, that blows over its surface. It is the same, also, to a great extent, with water, which soon becomes unfit for use if allowed to stand where it may be contaminated by impure air; and if placed in a cellar where it is exposed to air charged with the odors and spores of decaying vegetation, it soon smells and tastes like the foul, fever-breeding air that envelops it.

The *London Milk Journal* cites instances where milk that has stood a short time in the presence of persons sick with typhoid fever, or been handled by parties before fully recovered from the small-pox, spread these diseases as effectually as if the persons themselves had been present. Scarlatina, measles, and other contagious diseases, have been spread in the same way. The peculiar smell of a cellar is indelibly impressed upon all the butter made from the milk standing in it. A few puffs from a pipe or a cigar will scent all the milk in the room, and a smoking lamp will soon do the same. A pail of milk standing ten minutes where it will take the scent of a strong smelling stable, or any other offensive odor, will imbibe a taint that will never leave it. A maker of gilt-edge butter objects to cooling warm milk in the room where his milk stands for the cream to rise, because he says the odor escaping from the new milk, while cooling, is taken in by the other milk, and retained to the injury of his butter. This may seem like descending to little things, but it must be remembered that it is the sum of little things that determines whether the products of the dairy are to be sold at cost or below, or as a high-priced luxury. If milk is to be converted into an article of the latter class, it must be handled and kept in clean and sweet vessels, and must stand in pure, fresh air, such as would be desirable and healthy for people to breathe.

For reasons already given, cellars that are used for milk setting should never have turnips, potatoes, apples, or anything stored in them that will emit the least odor, and the air should be kept as pure and free from dampness as possible.

**Effect of Thunder Storms on Milk.**—It is a fact known to almost every person having any experience in the care of milk, that thunder storms will frequently cause sweet milk to turn sour in a short time, especially if there seem to be certain atmospheric conditions attending it, such as a superabundance of electricity. In order to prove whether there was any foundation for this opinion so prevalent among dairymen, Mr. M. W. Iles tried the following experiment, the result of which we clip from the *Journal of Chemistry*. He says:

"I took skimmed morning's milk, filled an eudiometer tube (300 c. c.), and introduced 100 c. c. pure oxygen gas; then by the use of an ordinary battery and a small Ruhmkorf coil, sparks of electricity were made to pass through the oxygen for five minutes. The current was then broken, and the tube shaken up and allowed to stand for five minutes. The milk does not appear quite as opaque, and shows a noticeable acid reaction. On continuing the current for five minutes longer—making ten minutes in all—the milk curdles very perceptibly, and shows a decided acid reaction. The contents of the tube, on standing for twenty minutes, has reached the consistency of ordinary sour milk or 'bonny clabber.'"

The cause of the rapid souring of milk in thunder storms is due to the oxygen being converted into ozone, the increased acidity being due to the formation of lactic acid, and doubtless some acetic acid. By means of the ozone these acids cause the casein contained in the milk to be precipitated.

**Butter as an Article of Food.**—As an article of diet, butter was used at an early period of the world's history, it being made from the milk of sheep and goats. The wandering tribes that were accustomed to take long journeys, doubtless took with them a supply of milk in skins,—of which their bottles were made,—and the agitation of the milk in travel-

ing would probably cause butter to be mixed with the milk. This may be the means that suggested the first rude and simple process of churning, such for instance as that employed by the Arab, who fills his skin bottle with milk, and strapping it on his horse behind him, gallops his fleet courser over the desert plains, until the milk is sufficiently churned by this process to produce butter. The oldest Greek writers speak of milk and cheese, but there is no mention of butter by them. It is supposed that the Greeks obtained their knowledge of butter from the Scythians or the Thracians, and the Romans theirs from the Germans.

In the time of Christ butter was used principally as an ointment in the baths, and as a medicine. In many of the warm latitudes, at the present day, its use is limited, olive oil being employed as a substitute. Butter is the fatty portion of the milk of mammalian animals. It has been made from the milk of sheep, goats, and other animals; but that made from cow's milk is the most delicate and delicious in flavor, and it alone constitutes the butter of commerce. It is found that the milk of various breeds of cattle differs greatly in the proportion of fatty matter it contains, its richness being due to the proportion of butter globules which are found floating in the milk, and which give it its whitish color, and render it opaque. The proportion of butter or fatty globules in the milk varies somewhat with the breed, and is largely influenced also by the season, nature, and quantity of food, state of the animal's health, and other conditions.

The proportion of cream to milk, in most cases, ranges from one-twentieth to one-tenth, although with individuals of some of the celebrated butter breeds, such as the Jerseys or Guernseys, it frequently amounts to from three to four-tenths.

Voelcker briefly gives the composition of butter, and explains how casein injures its flavor. He says: "Butter consists mainly of a mixture of several fats, among which palmitin, a solid crystalizable substance, is the most important. Palmitin, with a little stearin, constitutes about sixty-eight per cent. of pure butter. Mixed with these solid fats are about two per cent. of odoriferous oils. The peculiar flavor and odor of butter are owing to the presence of this small proportion of these peculiar oils, viz., butyric, capronic, and caprylic. In butter, as it comes upon our table, we find besides these fatty matters about sixteen or eighteen per cent. of water; one to two per cent. of salt, and variable small quantities of fragments of casein shells. The more perfectly the latter are removed by kneading under water, the better butter keeps; for casein, on exposure to the air in a moist state, especially in warm weather, becomes rapidly changed into a ferment, which, acting on the last named volatile fatty matters of butter, resolves them into glycerine butyric acid,  $C_4 H_8 O_2$ ; caproic acid,  $C_6 H_{12} O_2$ ; and caprylic acid  $C_8 H_{16} O_2$ . The occurrence of these volatile uncombined fatty acids in rancid butter, not only spoils flavor, but renders it more or less unwholesome."

If these casein shells could be separated from the butter, it could be preserved for a long time without salt. When butter is melted and the impurities taken out by heat, the same as lard is manufactured, it becomes more like oil, and loses its peculiar aroma and texture. When unadulterated and prepared with ordinary care, butter should contain at least ninety per cent. of pure fat, the remainder consisting of casein, water, and salt. Casein, derived from a remnant of milk not washed out of the butter, may be found, but should not amount to more than from two to four per cent., nor should water be found in quantity more than from three to six per cent.

A small quantity of salt is worked into the butter during its preparation, but this should not exceed in quantity from one-half to two per cent. of the whole weight.

Statistics show that Great Britain consumes considerably more butter than her farmers produce. Next among European nations, Holland is justly celebrated for the quality and quantity of its butter product; but it is stated on good authority that nowhere outside of Paris, until quite recently, could one find those golden "pats" of such delicious flavor and delightful aroma, that have excited such a spirit of emulation among the more enlightened

dairymen of this country, and which has caused them to excel the dairymen of the old world in the production of that delicious article for table use commonly known as "gilt edged butter." The success attained in the manufacture of this grade of butter depends not so much upon any special breed of cows, as upon the care and perfect cleanliness with which all the processes are carried on, from the milking of the cows to the rolling and stamping of it for the market.

Notwithstanding the increased manufacture of this dairy product within a few years past, by the establishing of creameries in various parts of the United States, as well as the greatly augmented interest manifested in private dairies, the demand for the best grades of butter still largely exceeds the supply, as is evidenced by its scarcity in the market and the high price it commands. There is therefore every inducement for the dairymen and farmers of our country to endeavor to supply this rapidly increasing want by furnishing a product of the very best quality.

**Methods of Obtaining Cream.**—There are various methods of obtaining cream for the manufacture of butter, the most common of which may be classified into two systems, viz.: "Shallow Setting" and "Deep Setting." Besides these common methods of cream raising, there is in practice, to a very limited extent, another method known as the Centrifugal System.

By the first method shallow pans are used for holding the milk; by the second, deep open pans, or deep, closed cans, submerged in ice-water, or kept cool partly by means of water and partly cold air; and by the third, a centrifugal machine, so constructed that by its rapid revolutions the cream is readily separated from the milk in a few moments.

**Shallow Setting.**—It was formerly thought that more cream could be obtained from a certain quality of milk set in shallow pans than if it were set in deep vessels; and even at the present time this system still has its followers; but the majority of dairymen of the present day prefer the deep-setting. By this system shallow pans are used for setting the milk. This method of setting is quite convenient where there is only a small quantity of milk, and answers the purpose very well, provided the pans can be so arranged that the milk can be either warmed or cooled as necessary, to maintain a uniform temperature of sixty degrees. A cool, well-ventilated dairy-room, easily controlled, will be essential for shallow setting.

The milk is generally set about two inches deep, and the pans partially submerged in cold water, either running water from a cold spring, or a tank for holding a sufficient supply of water for the purpose, which is kept cool by the use of ice.

There are, however, many objections to this old method of cream raising, the principal being that uniformity of quality in butter cannot be secured by it, since it is almost impossible to maintain a uniform temperature of the milk, it being subject, more or less, to the conditions of the weather, state of the atmosphere, etc. When the weather is favorable, the butter made by this system of cream raising will be of good quality, other conditions being desirable; but in very warm, muggy weather the cream will generally be of poor quality. By this system, also, a large proportion of the milk is exposed to the air, thus affording the opportunity of its absorbing any impurities the air may contain, giving the butter unpleasant taints and odors, and greatly injuring its quality.

Milk set in this manner will also be more exposed to influences pertaining to the changes in the electrical conditions of the atmosphere, as well as its temperature, than by deep setting. Both cream and milk, as has been previously shown, readily absorb any taints and odors that may be contained in the air, and this is more frequently the cause of a deteriorated quality of butter than is commonly supposed. Besides exposing the milk to the injurious action of the air by shallow setting, as has been stated, this system involves much more labor than by

the more modern system of deep setting, as it requires a large number of pans, and they must, of necessity, be kept scrupulously sweet and clean.

**Deep Setting.**—The old method of shallow setting for cream raising has, in a great measure, been superseded by that of deep setting, as it has been found that if a proper temperature is maintained, as much cream, if not more, can be obtained by the use of deep vessels, and also that of a better quality, than by the old system.

In a series of experiments made by Fleischman, at the Experiment Station in Baden, in the Grand Duchy of Mecklenburg, it was found that a certain quantity of milk produced by deep setting at a temperature of  $40.2^{\circ}$  in twelve hours, was 82.5 lbs.; in twenty-four hours, 89.5 lbs.

By shallow setting of the same quantity and quality of milk at a temperature of  $57.2^{\circ}$ , 80.1 lbs. of cream were obtained in twelve hours, 87.4 in twenty-four hours.

By the deep setting method a less quantity of milk and cream are exposed to the action of the atmosphere, thus affording a less opportunity for its being affected by foul air that may impart taints and odors, than by shallow setting, while a uniform temperature can be more readily maintained, and there is a saving of labor and expense, since a smaller number of pans or cans would be required.

In addition to the advantages of deep setting, already mentioned, might be cited the greater convenience of cooling the milk in summer by the use of spring water, and of warming it in winter to the proper temperature, than the old method affords.

Large, deep, open pans or vats have been used, to some extent, in large dairies and creameries for setting the milk, some of them large enough to hold the milk from a hundred and fifty cows or more. Underneath and at the sides and ends is a channel constructed, or pipes arranged, through which warm water may be kept constantly flowing in winter, and cold water in summer, to maintain a proper degree of temperature. This is an improvement upon the shallow pan system in many respects; still it is open to objection, as a considerable portion of the milk is thus exposed to the action of the atmosphere.

Another method is to construct large vats for holding water, with racks in the bottom for setting the cans upon. By this plan the water should flow through the vats.

By having the cans or pails twenty-two inches deep and filled with milk to within five or six inches of the top, and the water in the tank seventeen inches deep, a uniform temperature may be easily secured. Such cans should always be made of tin; a suitable diameter for the previously mentioned depth being eight inches. Care should be taken that the surface of the milk in the pail is not above that of the water in the vat. There should be a sufficient flow of water through the vat to remove the animal heat of the milk within an hour or less where ice is not used.

The accompanying cut represents a pail designed for vats, or for setting milk in pools; also a dipper or skimmer for removing the cream. The best method of deep setting that has ever yet been devised is in our opinion that in which the milk is kept in deep, closed cans, which are surrounded by ice or cold water in summer, or kept at a desired degree of temperature partly by ice or water, and partly by cold air. This method admits of various modifications, as the many kinds of creamers in the market at present show, the object aimed at by the inventor of each being to obtain as large a quantity of cream as possible from the milk in a short time, and while it is sweet.

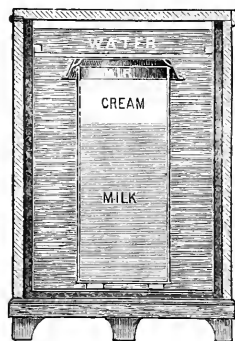
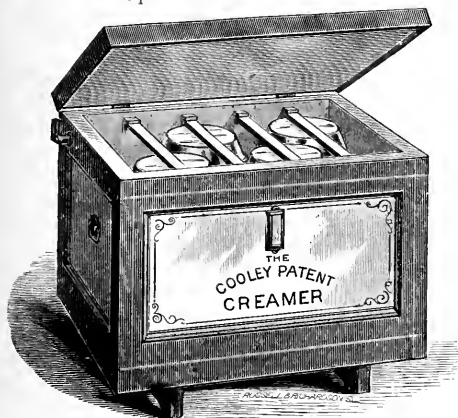
According to the plan of some, the milk is entirely submerged in water, while with others less water is used. The Cooley Creamer, manufactured by the Vermont Farm Machine Company, at Bellows Falls, Vt., is a good illustration of the deep setting system.



PAIL AND CREAM  
DIPPER AND SKIMMER

By the Cooley process of deep setting, the cans are submerged in cold water, the water being prevented from entering the pails by the use of an inverted, pan-like lid, the flaring sides of which descend two inches below the tops of the pails and hold the air confined so that the water cannot rise over the edges of the pails. The covers of the cans fit loosely, and the top of the milk in the cans is in direct communication with the cooling influence of the water. Any odors in the milk are in the form of light, volatile gases, which quickly rise to the surface, and are absorbed by the water beneath the cover. It is well known that cold water will readily absorb any odor or taint from any other liquid of a warmer temperature, if the two are placed near each other, and this principle is practically illustrated by this method. To facilitate this process, and enable the water to more readily draw the odors from the milk, the covers are raised upon wires, as shown in the following cut of the interior of the can.

These cans are nineteen inches deep and nine inches in diameter, the covers are fastened down, and the air under the rims of the covers prevents the passage of any water into the cans. The cans are set in the water coolers, which are lined with metal, and fitted with inlet and overflow for using flowing spring water, where such is at hand. A thermometer is inserted in the front of each cooler, in order that the temperature can be ascertained without raising the cover. The apparatus is very simple, dispensing with costly milk rooms, as but little room is required.



INTERIOR OF CAN.

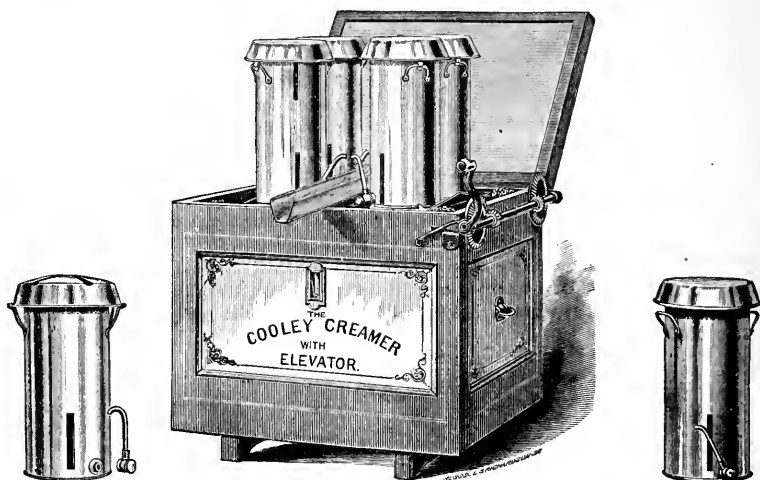
If the temperature of the water in the cooler is kept at 40° to 50° in spring and summer, and at 40° or below in winter, the cream will rise between milkings, in which case only cans enough to hold a single milking are required.

By this system of setting the milk, sweet cream is obtained from sweet milk in a short space of time.

The water should be frequently changed, for when used for a long time without removal, it becomes charged with odors that have been absorbed from the milk in the cans. At the same time this process of submerging the cans in water prevents the milk from absorbing taints and odors from the outside air, a difficulty not obviated when milk is set in any kind of open pan. It will be seen by the above description and illustration, that the covers of the cans are so arranged that all noxious gases can readily escape into the water, into which it is submerged, while the water is prevented from entering the can and mixing with the milk, and the atmosphere outside is prevented from contaminating the milk in any way.

This system of butter-making seems especially valuable in small dairies, where first-class facilities for caring for the milk have not been attained.

The cut on the left of Creamer, shows a single can as it appears when detached for any purpose, as for being washed, or for sunning; that on the right represents a can with faucet detached.



COOLEY CREAMER WITH ELEVATOR.

The cans in the above engraving stand upon a cast-iron platform, and are held firmly to it by a wedge that can be easily removed. The covers of cans are fastened to the handles with a catch, which can be readily turned in or out. The shafts over which the chains wind are provided with drums, with grooves to guide them, thus preventing the chain from winding over itself, and making it work evenly and steadily.

Several improvements have been put into the cans. Prominent among these is the new faucet, with extension tube. The faucet can be easily taken to pieces for cleaning, if necessary.

The bottom of the cans incline toward the faucet. Should any dirt or anything known as sediment get into the milk, and settle to the bottom of the can, it will be drawn out in the milk, and carried off by it.

With this Creamer a galvanized iron trough is provided, running between the cans, for

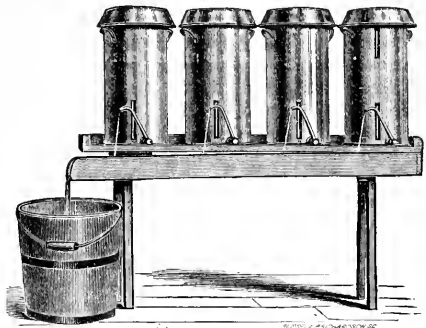


THE COOLEY JUNIOR.

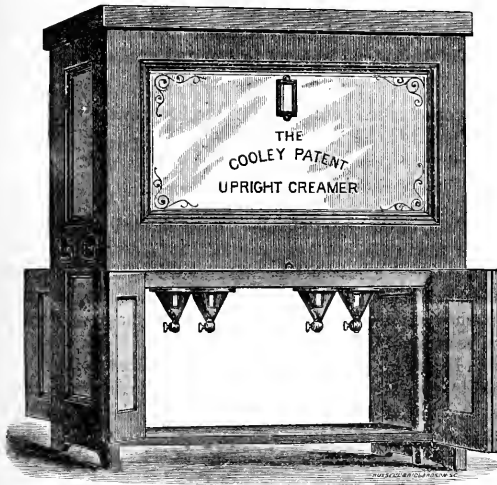
conducting away the skim milk. The extension tubes are swung over the trough, and set at proper height for running out the milk and leaving the cream in the cans, care being taken to set the mouth of tubes high enough to prevent any cream running out. If by looking through the glass panel at the bottom of can, it is found the milk is not quite out, lower the mouth of tube until it is. The cream can then be poured out or drawn off through the faucet into the cream pail. This process of separating the cream from milk is so rapid an operation that the average time is less than one minute per can.

The Junior Creamer is so arranged that the milk and cream can be drawn out and separated without removing the cans from the cooler. The glass panel in the can stands directly in front of the panel in the water tank. The skimming is automatic, the same as the regular Cooley can. The cans are easily removed when necessary for cleaning, or other purposes.

The cut of the skimming bench shows a simple device to be used with the plain creamer upon which to place the cans when drawing off the milk and cream.



SKIMMING BENCH.



UPRIGHT CREAMER.



CAN.

This bench should be set with one end against the creamer, so that the cans as they are lifted out can be readily placed upon it, thus avoiding any drip on the floor.

The above cut represents the upright creamer. The upper portion is the same as the regular style creamer. The cans are made with funnel-shape bottoms, and provided with a

glass pane and an outlet faucet at the point. The side of funnel in which the glass pane is placed is nearly perpendicular, or on a line with the side of the can, the back side of the funnel tapering to that side. This construction prevents a whirlpool, as is the case where tubes or a funnel of perfect cone-shape are used. In this funnel the cream line descends unbroken, and is distinct when it arrives at the glass pane and a perfect separation can be made, which can not be done in tubes or perfect cones.

Each can is provided with metal coupling, so that it can be readily removed when desired. The figure on the right shows the can detached from the creamer.

This style of creamer is preferred by some, but it requires more care in skimming, each can needing to be watched while the milk is being drawn off. In other styles the tube is set and left, and requires no watching; it will stop itself at the right time. The other styles have advantages also in the ease with which the cans can be removed from creamers for washing or sunning.

**Centrifugal System of Raising Cream.**—This system of cream raising has been practiced in this country to but a limited extent. We are indebted for our facts respecting this system to Mr. Edward Burnett, proprietor of "Deerfoot Farm," Southboro, Mass., who has had several years of practical experience with this method. This gentleman has one of the largest milk, butter, and cream dairies in the Eastern States, sending his dairy products to Boston in special cars. A description of the centrifugal machine used in Mr. Burnett's dairy, will be found in connection with Model Farms (page 597, Vol. I.). It is a well known fact that the separation of cream from milk is the result of gravitation. The fat globules being of less density than the watery portion of the milk, they rise to the surface. With this fact in view, Mr. Burnett says:

"The centrifugal machine produces a very powerful and forced gravitation, which develops this separation almost instantly and with great rapidity. At 120 revolutions per minute, a weight six inches from the shaft would be equal to two and one-half times its specific gravity.

|                                    |         |                             |
|------------------------------------|---------|-----------------------------|
| At 600 revolutions per minute=     | 61½     | times its specific gravity. |
| " 1,000        "        "        " | = 170   | "        "                  |
| " 2,000        "        "        " | = 684   | "        "                  |
| " 3,000        "        "        " | = 1,537 | "        "                  |

As early as 1859, Prof. C. I. Fuch, of Carlsruhe, Germany, experimented with a centrifugal machine for separating cream from milk, but it was not until 1877, nearly twenty years later, that Ledfeed developed and patented a machine for the purpose. This excited much interest in Europe, and later machines were built in Denmark, Sweden, and Norway, differing, however, only as to their method of obtaining the final separation of the cream from the skim milk. In this country ten years ago, Rev. H. F. Bond, of Northboro, Mass., worked out this problem, and obtained cream in about one hour with a small, crude hand machine, consisting of two glass jars attached to a spindle and making only 200 revolutions per minute.

My own machine, patented in September, 1868, by D. M. Weston, of Boston, has probably the largest capacity of any in the world, the basket being about two feet in diameter, with a 12-inch opening on the top, and a depth of about 10 inches. It is constructed in every particular like a centrifugal hydro-extractor, with the exception that instead of the cylinder being perforated, it is perfectly tight, with a top flange extending inward towards the centre. In this cylindrical basket are ten floats or dams from top to bottom, for the purpose of compelling the fluid or milk to travel with the machine. This is substantially all, and it can be used for separating various fluids or solids of different specific gravities. Our first experiment was at 1,200 revolutions a minute, running about twenty minutes, then stopping the

machine slowly, and when at rest skimming off by hand the cream which lay on the surface in large, thick patches, and of the consistency of clotted cream.

At a subsequent trial we used a bent tube, and scooped off the cream while the machine was in motion. Now I have adopted a simple arrangement by which I catch the cream thrown over the flange already described in a stationary pan, on top of the curb, which surrounds the basket, and lets off the skim milk by valves in the perpendicular wall, which are perfectly controlled, even when at full speed. This enables me to use it as a continuous machine, and I now handle about four tons of milk daily. Having increased the speed to 1,500 revolutions per minute, we run about 80 gallons per hour.

The most favorable results are obtained when the milk is warm from the cow; it then throws off the thickest cream in the shortest space of time.

Let me here state that the pressure exerted on the walls of this cylindrical basket is 200 lbs. to the square inch, or 50 lbs. greater than a government inspector requires on a new high pressure steam boiler, so that a machine must not only be constructed of the best material, but in the most thorough and workman-like manner.

With this short description of the machine I will now give a few results from my various experiments. On the fourth of last June, mixing thoroughly all my morning's milk, 704 lbs. were run into the centrifugal and yielded 35 lbs. 8 oz., or 1 lb. of butter to 19.83 lbs. of milk. This was churned in an old-fashioned barrel churn after 24 hours, at a temperature of 50°, and the butter came in exactly 17 minutes. 660 lbs. of the same milk set 24 hours in deep pails immersed in water at 45° and skimmed very carefully by hand, yielded 32 lbs. 4 oz., or 1 lb. of butter to 20.46 lbs. of milk. This was churned after standing 24 hours at 60°, and it took 53 minutes to bring the butter. I wish to call attention to the difference of temperature in the churning of the two different lots of cream, 10° in favor of the centrifugal; and the length of time occupied with that cream only 17 minutes, against 53 of that from the pails.

About the same results in favor of a slight gain for machine were obtained from many subsequent experiments, but a neighboring farmer and butter-maker, who had rather laughed at 'Burnett's new-fangled machine,' after a good deal of persuasion on my part, this winter divided his milk, setting one-half, or 80 quarts, in small pans 24 hours, his usual method, and placed these in a cold, damp cellar at a temperature of about 55°. The other half in 10 or 15 minutes was separated by my machine and yielded 8 $\frac{3}{4}$  lbs. of butter against 5 $\frac{1}{4}$  in the pans. Making a second experiment at my suggestion, and using a tank and some of my deep pails with the same quantity of milk (80 quarts), he obtained 6 $\frac{3}{4}$  lbs. of butter from the machine, and 6 $\frac{1}{4}$  lbs. of butter from the pails. He also found, on churning, a great saving of time with the machine cream, which occupied only 11 minutes against one hour with the cream set in deep pails. I cannot vouch for the accuracy of this experiment, but will simply say that he is a very good farmer, and one that naturally would take great pains in doing it thoroughly.

Wishing to try the effect of old milk, I took July 1st and set a portion of the morning's milking thoroughly mixed in pails in a tank, the water at from 45° to 50°. The next morning, 24 hours afterwards, 165 lbs. run through the machine, yielded 8 lbs., or 1 lb. of butter to 20.62 lbs. of milk; 126 lbs. skimmed carefully in the pails by hand, yielded 6 lbs., or 1 lb. of butter to 21 lbs. of milk.

As will be observed, in all my trials there is a slight gain in favor of the centrifugal machine over the ordinary methods, and the Germans with their repeated experiments have also invariably found a gain of from 3 to 6 per cent.

The cream obtained by this method is remarkable for its peculiar sweet flavor and smoothness. Running it off slowly, then cooling below 50°, it is even thick enough to cut

with a knife. I have obtained a ready sale for it in Boston at an advanced price, and send it down every night in glass pint and quart fruit jars.

The skim milk is very thin and blue, and has a hard peculiar flavor, although perfectly sweet and remarkable for its freshness, like the cream. My chemists, Messrs. Lawrie & Terry of Boston, report the following analysis :

|                         |        |
|-------------------------|--------|
| Water, . . . . .        | 89.68  |
| Fat, . . . . .          | .90    |
| Casein, etc., . . . . . | 4.24   |
| Milk sugar, . . . . .   | 4.44   |
| Ash, . . . . .          | .74    |
|                         | <hr/>  |
|                         | 100.00 |

After running off the last of the skim milk we find a most offensive and greenish slime on the rear walls of the centrifugal basket, from 1-16 to  $\frac{1}{8}$  of an inch thick. The following is the analysis of it :

|                                      |        |
|--------------------------------------|--------|
| Water, . . . . .                     | 67.38  |
| Fat, . . . . .                       | 3.25   |
| Ash, . . . . .                       | 3.88   |
| Casein, . . . . .                    | 25.49  |
|                                      | <hr/>  |
| Decomposed products, etc., . . . . . | 100.00 |

The following letter accompanying this analysis struck me as rather amusing:

MR. BURNETT, DEAR SIR: I do not know in what quantities you get this refuse, but the best use of it I should think would be for fertilizing purposes, as it is very rich in nitrogen and phosphate of lime.

Yours, etc.,

A. D. LAWRIE.

From Dr. Fleischmann's paper published in Germany, I find he also speaks of this slime as follows: 'Although the milk treated in the various experiments was always passed through four fine metal sieves before being passed into the machine, more or less dirty matter was invariably found on the side of the drum at the completion of the process. Hence it appears that the rapid centrifugal motion cleanses the milk or cream far more effectually than the best made sieve could do, and it is only natural to suppose that butter obtained from such cream should be proportionately finer.'

I asked my friend and most obliging neighbor, Dr. E. S. Sturtevant, to come up with his microscope and spend the day at my dairy. The microscopical peculiarities reported by Dr. Sturtevant, are:

*First*—Its absolute purity, each globule standing out distinct and round, and no foreign material of any nature to be detected.

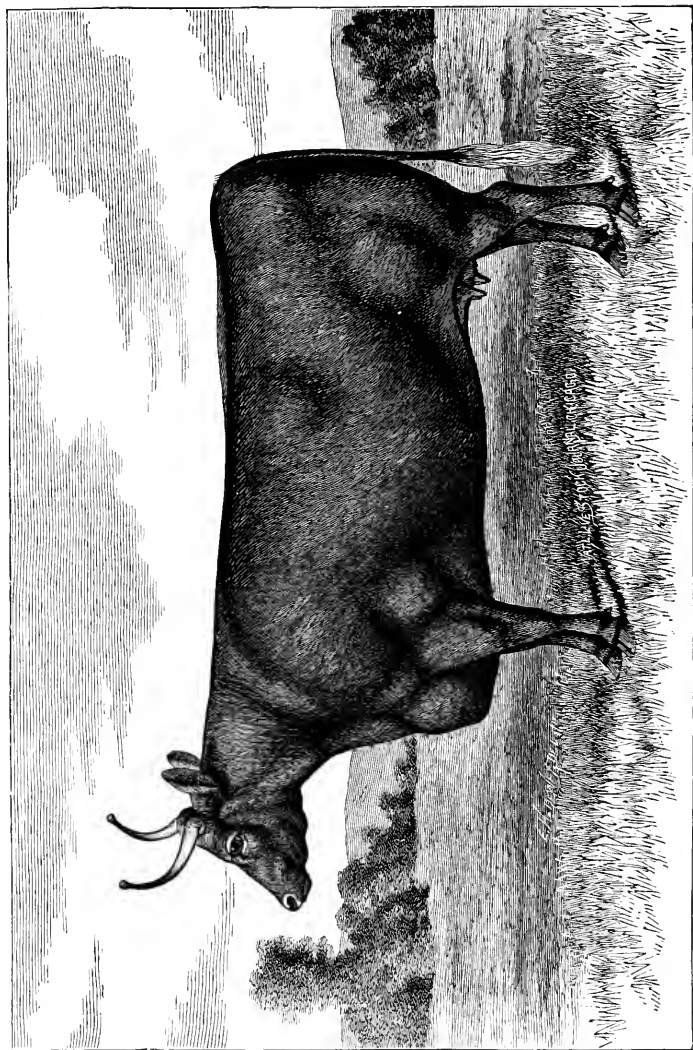
*Second*—Contrary to my expectations there were no ruptured globules.

*Third*—There was a noticeable uniformity between the sizes of the globules of each sample. The first cream taken from the machine having larger globules than the last cream. When, however, the machine was run continuously, this should not be so evident.'

Dr. Sturtevant, as well as myself, was rather disappointed at the result obtained of the specific gravity, but I find that the remarkable result obtained by Dr. Fleischmann, of 949.6, was from a small portion of dried, thick cream taken from the uppermost surface of the contents of the German machine. Dr. Sturtevant's own result with ordinary cream of 983 was taken under the most favorable circumstances. Arnold gives his as 985; Hanneberg, 1004.9 to 1005.5; Voelker, 1012 to 1019; Letheby, 1013; Berzelius, 1024.4.

The butter obtained from the centrifugal cream is like any other good butter, except that we have noticed a slight loss of color.





NORTH DEVON COW, "HENRIETTA."  
Owned by Gen. L. F. Ross, Avon, Ill.

An important fact lately developed by Dr. Sturtevant is its melting point, 98°, being remarkably high. He found exactly the same result, however, from my own dairy as from that of my neighbors', which furnished two samples from the same milk treated by the machine, and by the ordinary process, and was 98° and 94° respectively.

I have also had constructed a perforated basket for extracting the buttermilk by centrifugal force, and now treat all my butter by this method most successfully. After two or three rinsings in brine, it is removed from the churn while in small pellets and placed in a cloth. It is then put in the basket of the machine, which, in less than a minute after full speed is obtained, is brought to a standstill. The texture of the butter is fine and the grain uninjured and very solid."

The Danish machine for raising cream by centrifugal action has created considerable sensation in Europe. By a recent report made to the Danish Agricultural Society, it appears that by the centrifugal system of cream raising, one hundred pounds of butter were made from the same quantity of milk that produced but eighty-eight pounds by the deep setting process after fifteen hours setting, and only ninety-two and a half pounds after thirty-four hours setting, and eighty-seven and a half pounds in thirty-four hours by the shallow setting mode.

In making these experiments thirty pounds of milk by the centrifugal process were equal to thirty-two and a half to thirty-four pounds by the ice system (deep setting), and to thirty-four pounds by shallow setting.

In another experiment covering a month in time, it required on the average but 29 pounds of milk by the centrifugal system to equal 32 pounds by the ice system, while other experiments showed even greater differences. It was also found by chemical examination that butter made by the centrifugal system contained less water, and that the skimmed milk contained less fat.

The objection to the general use of the centrifugal machine would be its expense, unless farmers combine in order to enjoy the benefits, as they do in the creamery and factory systems.

**The Fairlamb System, etc.**—This system of cream-raising is comparatively speaking a new one, the can used by them having some peculiar features. It is nineteen inches and a half in height, and twelve inches and a half in diameter at the top, ten and a half inches being the diameter at the bottom. There is a tube in the centre four inches in diameter and sixteen inches high, the tube being connected with the outside of the can, at the top, by a pipe three-fourths of an inch in diameter. The can is provided with a cover of tin and rubber which excludes all air.

It has also a glass gauge marked with a scale of inches for indicating the amount of cream raised on the milk. The advantages claimed for it are, its small cost, its probable durability, that by its use cream may be raised in from twelve to thirty-six hours, according to the season and temperature, and that it requires no special place for setting in order to raise the cream.

A low temperature will raise the cream in less time than a high one. For illustration; At 32 to 40 deg. F., the cream will raise in 12 hours; at 50 to 60 deg. F., from 12 to 24 hours; and at 70, to 80 deg. F., 24 to 36 hours will be required to get the full amount of cream. It is claimed also that by the use of this can, milk can be cooled quickly or slowly, as may be desired, and that in either case there will be no change in the quality of the milk; the cream at the same time being free from all flavors or odors that may exist in the surrounding atmosphere.

The method which has been adopted in the Fairlamb system consists in gathering cream (instead of milk) from dairies by the agents of the factory. The dairies are supplied with the cans referred to above, the cream being measured by the gauge placed in the side

of the can, an inch of cream being one inch in height by twelve inches in diameter. The agent skims the cream, gives each dairy credit for the number of inches of cream taken, deposits the same in the hauling cans in his wagon, and delivers it to the factory. It is then stored until it has ripened, when it is ready for churning. By the above method a better quality of butter will be made than by the old creamery system of hauling the milk to the factories, for the following obvious reasons:

The milk, by hauling, sustains a loss in quality by generating a gas caused by the motion of the milk in the cans. The dairymen, as a rule, do not feed for the best result in cream, but feed for a quantity of milk, regardless of its richness or butter value, as the milk would only sell at the common price paid; consequently there is no encouragement for the keeping of blooded stock, or such stock as would produce the best and richest milk. It simply results in a loss to the dairy furnishing the richest milk, and becomes a profit or gain to the dairy furnishing a poor quality. It is plain to be seen that the best quality of butter can only be made by the method that pays the dairy for the milk according to its richness, instead of paying for weight, regardless of quality.

The cost of hauling cream and making butter at factories is about the same as the cost of making butter at the factories where the milk is delivered by the dairymen. By the new method there is a saving in the hauling of the milk of from three cents to five cents per pound on the butter made. Another advantage is a gain in the quantity of butter made of about one-half pound per hundred weight of milk; that is, a hundred pounds of milk set at the dairy will produce one-half pound more butter than the same milk will produce after being hauled to the factory. There is also claimed an increase of twenty-five per cent. in the butter product over the old creamery system. This is obtained by the personal attention of the dairyman in setting the milk and in having a guide or reference on the cans (the gauge), which will teach the secret of how to produce the most cream or butter. By the Fairlamb system the skim milk is left at the farm also, which is an advantage.

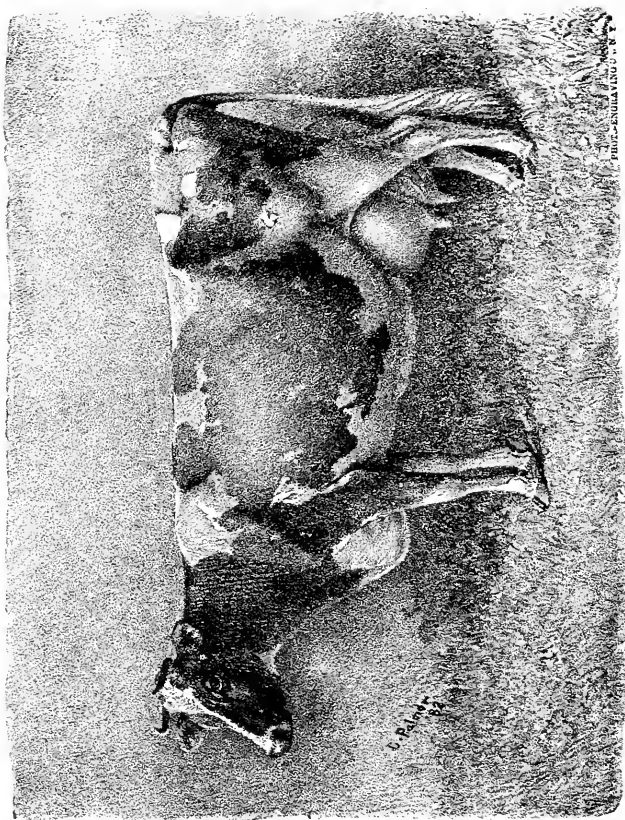
**Other Systems.**—The accompanying cut represents an improved cooling can, designed to be used where cream is gathered from the dairies and paid for by the inch, as shown by the glass in the side. In this can the principle of cooling from the top is applied, ice being placed in the tight-fitting, sunken cover, a drip tube from each side leading into the horizontal airing tube. In warm weather it is set in cold water, in cool weather it may be set in the open air, and used without ice. Besides those already mentioned, there are various other modes of cream raising, each having certain peculiarities, such as Ferguson's, Clark's, Moseley's, and Butler's methods, etc. In the first-mentioned the pan containing the milk is pushed into the bureau, where, by means of ice, the milk is cooled to 58° or 60°; the second consists of a series of pans, set one close over the other, cooled by ice water running around them. The peculiarity of the third is in the cans being set in a bath of ice water, with a device to draw the milk and cream off through spouts with glass necks in the bottom, the glass being for the purpose of seeing the cream. Instead of closing the milk from the air, this has ventilators to admit the air. The last mentioned is constructed on the plan of submerging the upper half in cold, or ice water, while the lower half is in air. The cans also have a novel point in a conical glass bottom, so that the milk can be seen while escaping, and stopped when the cream appears.

When a small quantity of water is mixed with the milk at the time of setting, a larger quantity of cream will rise in the same space of time, than without it. The quantity of butter made from milk will also be slightly greater from milk treated in this manner, but the quality will be somewhat deteriorated.



COOLING CAN.





GUERNSEY COW, "ELEGANTE."

Fernwood Farm, Cazenovia, N. Y. Sweepstakes winner, N. Y. State Fair, 1881.

**Temperature for Obtaining Cream.**—The best temperature for obtaining cream is generally considered to be about  $60^{\circ}$  to  $62^{\circ}$ , although some dairymen are of the opinion that  $58^{\circ}$  is to be preferred. The butter-makers of Orange County, New York, whose dairy products have been justly celebrated for their excellence, are of the opinion that the best quality of butter can be made from cream that has been obtained at a temperature slightly below  $60^{\circ}$ . It should never be above  $64^{\circ}$ . The milk serum becomes more and more dense as the temperature sinks, and offers increased resistance to the rise of the butter globules. Rapid cooling of the milk after milking will give a larger yield of cream within a reasonable time, than slow cooling. The more quickly the milk cools from the sides and bottom of the vessel in which it stands, and as a result the more promptly the currents through the milk are checked, the sooner can the butter globules move freely and without interruption through the mass to the surface. The cooling should not however go below a certain point, for as it approaches  $32^{\circ}$  the serum becomes thicker and the rise of the butter globules is consequently retarded. The temperature should be slightly higher in winter than in summer. Freezing the milk or cream injures the quality of the butter.

**Quality of Cream at Different Skimmings.**—As soon as the milk comes to rest after leaving the udder, the small round butter globules that are held in suspension, or floating in it, being lighter than the mass of cheesy and watery materials by which they are surrounded, begin to rise to the surface. The largest globules, being comparatively the lightest, rise to the top first, and form the first layer of cream. This will be cream of the best quality which the milk can produce, since it is less filled with casein. The fatty globules next smaller, rising a little more slowly, are more intermingled with other substances, and bring them to the surface, while the very smallest globules, rising the slowest and last, are still more encumbered with foreign substances, and will produce an inferior quality of cream and butter. It will readily be seen that richest and most delicate cream, as well as the sweetest and most fragrant butter, is that obtained by a first skimming only a few hours after the milk is set. Of three skimmings at six, twelve, and eighteen hours after the milk is strained, that first obtained will make more butter and that of a better quality than the second, and that next obtained better than the third, and so on. It has already been stated that the milk last drawn from the udder is the richest that the cow is capable of giving. If the last quart or two of a milking is set by itself, and the first cream that rises be taken off after standing only five or six hours, it will produce the richest and highest-flavored butter the cow is capable of producing, under like circumstances as to season and feed.

**Butter from Sweet, and Sour Cream.**—There has been considerable discussion in the past among dairymen, as to whether butter should be made from sweet cream, or that slightly sour, each method having its advocates, who claim superior advantages to be derived from their own theory and practice over the other; viz.: a larger quantity and a finer quality of butter. We believe no better butter can be produced, other conditions being equal, than that taken from the milk while it is sweet, and churned before it has become sour. The old time supposition that milk must *sour* before butter can be made from it, is erroneous, as the more common practice of the sweet cream butter-makers of the present time has fully demonstrated. Butter having a fine aroma can be made from cream but *slightly* sour, as is the custom in the Holstein dairies; but butter that is made from cream that is quite sour is destitute of this peculiar aroma, and has the taste which the Holstein butter acquires after being kept for some time.

The Secretary of the Royal Agricultural Society of England, in his "Hints on butter-making,"—a pamphlet in which he refers to the shortcomings of his countrymen in the manufacture of this dairy product, is of the opinion that one of the principal reasons for so large a quantity of poor English butter being found in that market, is in permitting the milk to be set so long that it becomes sour before being skimmed, or if it is skimmed sweet,

the cream is allowed to sour before churning, and curdy or caseous matter becomes mixed with the butter, which soon gives it a rancid taste.

In sweet cream, the hydrate of casein is less readily formed than in sour cream, hence sweet cream requires more churning than the sour. The practice of churning milk, instead of letting it stand for the cream to rise, is followed in some countries. Although very good butter may be made in this manner, it requires much more labor, and the method of first raising the cream is much to be preferred.

**Churning.**—Butter is the fatty substance extracted from the milk, and churning is the operation in the manufacture of butter by which these fatty particles are separated from the other constituents. By the churning process, by which means the whole mass of cream or milk is kept constantly agitated, the fat or butter globules are caused to unite in larger particles, and finally to separate entirely from the watery liquid, called buttermilk. As to what is actually taking place at the formation of the butter in the churn, chemists differ. It was the old hypothesis, and that advanced by Romanet, that each globule of fat suspended in the milk serum was enclosed in a very thin membrane, and that by the agitation or concussion produced in the churning process, these membranes burst, or were torn open, causing the butter grains to adhere together until a final separation of the fat globules, and the watery portion was accomplished.

The action being nearly alike on all the globules, the membranes enclosing them would all break throughout the whole mass about the same instant. It was also supposed by some, that acid in the cream caused the membrane to be dissolved or weakened sooner, and for this reason butter was produced from sour cream sooner than from sweet. The existence of the membrane of casein, or some albuminous matter, has however never been proved, and the theory is being abandoned by the best chemists of the present day in both Europe and this country, the present supposition being that the butter globules are simply suspended in the milk serum without any membranous covering whatever.

Prof. Freytag, of Germany, holds to the opinion that the butter globules, although not surrounded by a solid membrane, are, however, enclosed in a thin sheet of matters formed by the commingling and condensing of casein, albumen, and milk sugar.

Dr. Soghlet, of Vienna, after many experiments, arrived at the conclusion that the fat in the milk must exist in a liquid or melted state, since the globules would keep their regular globular form, even when cooling the cream to the freezing point of water, and that by shaking or the agitation of the churning process these butter globules are made to thicken.

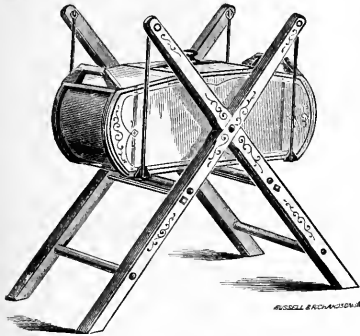
Dr. Storck, of Denmark, after considerable investigation, with various microscopic examinations at different stages in the mechanical process of churning, has advanced the theory that the formation of butter in the churn is commenced by the agglutination of the minute fat globules contained in the milk, but is completed by conglutination of the fat globules in this state by means of a peculiar substance known to chemists as hydrate of casein, produced by the churning process. Which of the many theories respecting churning is the correct one, or whether some entirely new theory yet to be advanced will supersede them all, remains to be determined; yet we believe the old one concerning a membranous covering should be entirely set aside. We shall not attempt to decide where so many chemists disagree. Neither is it of so much importance that farmers and dairymen should understand the scientific reasons for the phenomena accompanying the mechanical process of churning, as it is to know the *best methods of doing it*, and of attaining the highest possible results in the manufacture of the butter product.

One of the most important implements in the manufacture of butter is the churn. In the rectangular churn the butter globules are caused to unite by the concussion of the whole mass of cream against the sides of the churn, and the globules against each other, as it revolves, no dashes or paddles being used. These churns are well adapted for use in creameries and large or small dairies, being fitted with cranks at both ends, and so arranged that a pulley can be attached for connecting with power, if desired.

Of these there are various kinds in use, all having more or less merit. The most common, though not by any means the best, is the old upright "dash churn;" some being made of wood and some of stone.

Then we might mention the more noted, and certainly more to be preferred Barrel Churn, of Orange county fame. This is still much used, and with good success, in the larger dairies of the country. Then we have the Blanchard Churn, which has stood the test of use for many years, and is still held in favor by many good butter-makers.

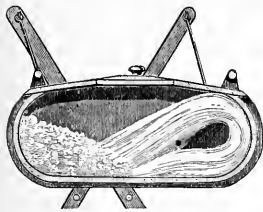
Among modern devices for churning that meet with strong endorsement are the following, the first of several shown, being the Davis Swing Churn, manufactured by the Vermont Machine Co., Bellows Falls, Vt.



DAVIS SWING CHURN.

The demand for a better grade of butter has called attention to the fact that the quality of the article depends very much upon the churn in which it is made. It is now conceded that floats and paddles inside a churn box are sure to injure the grain of the butter, the cream being whipped and beaten by them until the firm texture of the butter is destroyed, while by a swing or revolving churn this is obviated, the particles of the moving mass of cream coming in contact with each other and the sides of the churn only. The swing churn has a glass indicator in the cover, thus enabling a person to ascertain when the butter comes without raising the lid.

This churn belongs to the class known as Oscillating Churns, and is very simple in construction.

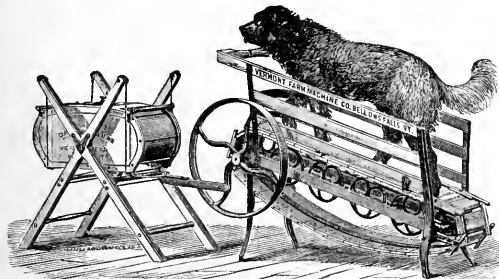


OPEN VIEW OF SWING CHURN.

The open view of the churn shows the motion of the cream in the Davis Swing Churn when in operation.

In churning, a dog, sheep, or goat is sometimes employed as a motive power in operating the churn. It is well known that either of the animals mentioned soon learns to run a churn and run it steadily,—the combination being a cheap and durable power in the dairy.

The Tartars are said to do their churning by putting the milk in a sheep-skin bottle, which they tie to the saddle, and take a brisk gallop for an hour or two; on returning the butter is made. This principle is the same as that of

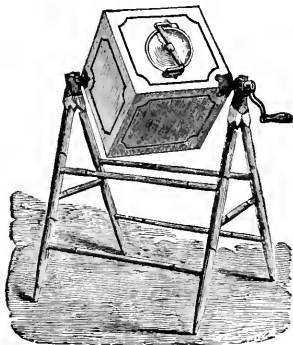


DOG AND SHEEP POWER.

our best modern churns, viz.: agitation of the milk in a vessel in which the contents are dashed from one side to another to break up the globules. It is the principle of all the dashless churns. The peculiar action of these churns produces the butter in small globules, as above mentioned, and in this condition the butter milk can be drawn off and the cold water or brine introduced into the churn, and the butter thoroughly washed and made ready for packing.

The Philadelphia Dash and Blanchard churns are both provided with dashers, and may also be used with or without power.

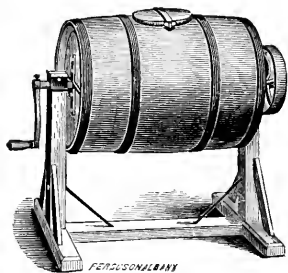
By the old process of churning the movements were perpendicular, an up-and-down motion with the dasher being employed. With the majority of churns now in use there is a rotary motion, which is a great improvement upon the old method. If the cream is thick



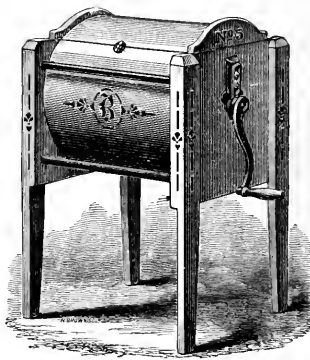
RECTANGULAR CHURN.



BUTTER GRANULES.



PHILADELPHIA REVOLVING DASH CHURN.



BLANCHARD CHURN.

and lumpy, it should be thinned with a little skim milk (not sour) of the proper temperature before putting it in the churn. Cream should not be permitted to stand very long before churning, and should be stirred sufficient to mix well when any additions are made to the quantity, in order that it may be of uniform quality throughout the entire mass. Cream that is not over twenty-four hours old, kept at a proper temperature, makes much better butter than that which is allowed to stand longer. Before putting the cream into the churn, turn into the latter a quantity of hot water, letting it stand five minutes, giving it a few dashes,

swings, or turns, according to the style of churn used; then draw off and rinse with cold water.

Never close the churn and put it away when wet, or even damp, as it will, if so treated, invariably mildew inside. The bearings should all be kept well oiled, in order to work easily. In the manufacture of butter the utmost cleanliness should be observed in every respect, and strict attention paid to what might be considered the "little things" in dairy management, as any neglect in one particular might spoil a large quantity of butter. In the first place, cows should have good pasturage, or a suitable quality and quantity of food, and proper management; due attention should be paid to cleanliness in milking, to setting the milk, avoiding all taints and odors in the atmosphere that comes in contact with it, and to churning the cream, salting and working the butter, etc. Cream that is set where the odors of cooking food can come in contact with it will readily absorb such odors, and take their flavor. Butter is often spoiled by setting the milk in wooden or earthen vessels that readily absorb taints from decomposing cream or milk, and which no washing or scalding could remove. The use of old rusty tin pans or cans in setting milk will also cause the butter to have a bad flavor. The cans or pans used should therefore always be sweet and clean and free from rust.

Hon. Hiram Smith, of Sheboygan, Wis., a recent winner of the sweepstakes of \$250 at the International Dairy Fair at New York, gives his method of butter-making, as follows:

"As soon as convenient after milking commences, the butter maker begins to carry milk into the butter room, and strains into Cooley cans, and immediately submerges them in tanks, in which water is running, and, as soon as the milk becomes as cold as the water, the water-pipe is removed and sufficient ice added to reduce the temperature to 45 degrees. This tank is then closed until just before the next milking, when the can is taken out and the milk drawn off and the cream added to a previous supply of cream, and the milk-can refilled and submerged again. In other words, the cream taken from Monday nights' skimming should be added to Tuesday mornings' skimming, and the whole cream thoroughly stirred; and in cool weather the temperature raised to 62 degrees, and kept in about the same condition until Wednesday morning. By this time the cream has ripened and become slightly thickened, with a little acid perceptible. When it is in right condition to churn, the temperature should be, when churning commences, 60 degrees in warm weather, and 62 degrees in cold weather; coloring matter added just before churning. Practice will determine the amount, as it will depend on the season and on the kind of feed used. The churn should be one that agitates the cream uniformly, so that the butter will all come at the same time. (I use the Rectangular.) As soon as the cream breaks into small pellets of butter the size of wheat kernels, the churning proper is done; add a pail or two of cold brine, then make a few revolutions of the churn, draw off the buttermilk and add brine to wash off the buttermilk; when allowed to drain a few minutes, add salt, one ounce to the pound of butter; make a few revolutions of the churn, and the butter comes together, free from buttermilk, and evenly salted. It is then taken out of the churn and placed on a lever butter worker, slightly worked, and then covered with a cloth and allowed to stand three or four hours, when it is reworked just sufficient to pack nicely, which should always be done before it becomes hard with the cold or soft with the heat, and the package kept in a cool place until the butter is eaten or sold. Good, healthy milk, treated as above, will in all cases produce first-class butter, irrespective of the weather—good to eat when new, and will keep the best of any method of which I am acquainted."

**Temperature of Cream While Churning.**—The temperature of the cream when it enters the churn should be between 53° and 62° F. During the process of churning it rises several degrees; the temperature while churning which is considered most favorable

for gathering the butter is from 64° to 66° F., this rendering it of proper softness and adhesiveness. If the cream is too cold while churning, the butter globules, being hard, will not unite as readily; while if too warm, they will be in a semi-fluid state, and consequently will not unite for this reason. Care should therefore be exercised to keep the cream at a proper temperature. It is generally conceded that the cooler the cream can be kept, and at the same time have the fat globules of a suitable temperature to unite, the better. It is generally known that the melting point of butter made on dry hay is a trifle higher than that produced on grass, or while feeding with oil cake, the quality of the feed influencing the character of the butter globules. This explains why it is sometimes necessary to churn a few degrees warmer in winter than in summer.

**Time Required for Churning.**—The time required for the butter to separate, as well as its quality and quantity, depends much upon the temperature. Half an hour, at least, is considered essential for churning by experienced dairymen, and from forty-five minutes to one hour when the quantity of cream is large. If the butter comes much sooner, it is liable to be soft and frothy; while if a much longer time is required, the butter will have a bad flavor. By a gentle, slow motion in churning, the butter leaves the churn in a better condition, and requires comparatively less working to extract the buttermilk. A good authority on this subject says:

“When butter is to come in a few minutes by violent agitation, as in the strife for the repute of quick work in case of trials of new churns, there is obtained, instead of good butter in dense and large clumps, a doughy mass consisting of little balls of fat mixed with buttermilk and cream, and full of air bubbles, which no skill in working can convert into good butter. While it is true that violent churning will produce a greater weight of so-called butter, it is demonstrated by chemical analysis that the milk or cream thus treated does not yield so much of its fat as is obtained by slower and gentler agitation. The greater weight of the product is due to the admixture of buttermilk, which is retained in the spongy mass. The fact that churning must go on for some time before any visible change is effected in the cream, and that the butter ‘comes’ somewhat suddenly, is due to the exceeding minuteness of the fat globules, of which myriads must unite before they attain a size visible to the unaided eye.”

As the buttermilk begins to appear, if a moderate quantity of water or brine at a temperature of 56° or 58° is added, the butter separates very rapidly.

**Washing Butter.**—In order to have butter keep well, without danger of rancidity and loss of its fine flavor, great care should be used to remove the buttermilk as completely as possible. It is a good plan to draw off the buttermilk from the churn, and turn in cold water in sufficient quantity to wash it thoroughly, after which a few revolutions of the churn will wash out the buttermilk. It can never be wholly removed by simply working or kneading the butter. Casein prevents butter from keeping well, and can only be removed by thoroughly washing it.

Some dairymen prefer weak brine to water for washing; in either case the butter should be washed until the water or brine comes out clear. The butter should not be permitted, however, to remain long in either water or brine during the washing process; the quicker and more thoroughly this can be done the better. It should be remembered that all brine used in washing butter should be carefully strained through a cloth before using, to remove any specks it may contain. In Holland it is customary to mix a considerable amount of water in churning, the butter thus being partially washed as it comes; besides, the butter is afterwards thoroughly washed with water. Butter thus washed is remarkable for its keeping qualities. Holstein butter makers put water in the cream while churning, but do not wash it afterwards. This butter has at first a delicious aroma, but does not keep as well as butter

that is washed. Swedish butter, made according to Gussander's method, in which the cream is raised in twenty-four hours at a temperature of 60° to 75° F., is prepared without water, and has a very fine flavor; but it will not keep any length of time, unless it is thoroughly washed before being salted. Salt removes but little from butter except water, and a small amount of sugar. The water used in washing butter should be entirely free from all impurities or flavors, such as a disagreeable taste imparted by a pump with pine tubing, or the impure water of some cisterns.

**Salting Butter.**—A little salt is generally added to butter to improve its flavor. It is also necessary to preserve butter that is to be kept long; butter can, however, be kept for some time without salt. Salt aids in removing buttermilk or water from the pores of the butter, and tends to prevent the casein and other matters that cannot be removed, from becoming rancid. The amount of salt to be used will depend, in a great measure, upon the time the butter is to be kept. Many dairymen use but a quarter of an ounce of salt to a pound of butter, when it is designed for immediate use; but when it is to be packed away for winter use, or kept for a considerable length of time, the general rule for salting is an ounce of salt to a pound of butter, although some use but three-quarters of an ounce of salt to a pound. Over-salting renders butter less palatable to the taste, and is less healthy as an article of food than fresh, sweet butter.

Never guess at the amount of salt to be used; first weigh the butter, and add the proper proportion of salt. Greater care is necessary in selecting the salt for butter than most dairymen are aware, as even the smallest quantities of the chlorides of calcium and magnesium in the salt will give the butter a bitter and unpleasant taste. These are the common impurities of salt. Salt should always be kept in a dry, pure atmosphere. Foul gases and taints may be absorbed by salt, although it is preserving in its nature. Salt that has been kept in a damp atmosphere, and exposed to the odors of decaying vegetables, cesspools, the cooking of cabbage or onions, etc., is not fit to be used in butter. It should never be left open to gather impurities, such as dust, crumbs from the pantry, etc. Butter is often spoiled by a neglect of such care. The pure fat of butter may be kept for months without becoming rancid; but by the usual modes of butter making buttermilk cannot be entirely removed, and the casein contained in it acts as a ferment upon both the sugar and the butter, the casein becoming changed to lactic acid.

**Working Butter.**—The object of working butter is to free it from the buttermilk it contains, and to distribute the salt evenly through the entire mass. It is well understood that the less manipulation the butter receives to accomplish this end, the better for the butter, as its grain is injured by much working. In working, the hands should *never* come in contact with the butter, as it will injure its quality.

There are various kinds of butter workers in the market, each having their respective



THE EUREKA BUTTER WORKER.

merits. Those which operate in such a manner as to expel the buttermilk with the least injury to the grain are, of course, the best. The Eureka worker is so constructed that all portions of the butter are equally worked, with even pressure, no drawing or sliding motion



LEVER BUTTER WORKER.

possible. The buttermilk is drawn off by a pipe underneath; the butter is rolled out into a thin sheet, a portion of salt is sifted on, then by a quick backward motion of the roller the butter is turned bottom side up or folded in the tray, rolled out again, more salt sifted on, again turned and rolled. This operation is repeated until a sufficient quantity of salt is sifted. The salt is then so evenly distributed that the butter is ready for packing without a second working.

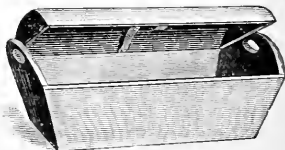
In the use of the lever worker, care should be taken to give an equal pressure to the entire mass of butter.

Before using any butter worker, hot water should be poured over it and the tray, making sure that all parts are wet with the hot water; when, after allowing it to stand for a moment, run it off and cool the "worker" with cold water.

Some prefer, after salting, with a slight working, to put the butter away in a cool cellar or ice-box, allowing it to remain till the salt is thoroughly dissolved, and then finish in the butter worker.

Before completing the working of butter, all moisture should be removed with a sponge or towel, and all butter clinging to the sides of the tray should be removed.

The butter tray of which we give an illustration is designed to hold the butter when taken from the churn, or worker, to be reworked, packed for market, and is very convenient for such a purpose. The oval cover, which is made to fit tight, in order to exclude dust, flies, and foul air, also increases the capacity of the tray. These are made to hold any amount of butter from forty to one hundred and twenty-five pounds.



BUTTER TRAY.

**The Grain of Butter.**—The description of the “grain” of butter is given by Willard, as follows:

“What is meant by the term grain as applied to butter, is a waxy appearance, and the more it resembles wax in its appearance the better the grain. When properly churned, both as to time and temperature, the butter becomes firm with very little working, and is tenacious. It then may be easily molded into any shape, and may be drawn out a considerable length before breaking. It has a smooth and unctuous feeling on rubbing a little between the finger and thumb. When the grain is injured the butter spreads like grease, and the more it resembles grease the more is the grain injured. Good butter that has not been injured in the grain will not stick to the knife that cuts it. Butter that has no grain is brittle, and when broken presents a jagged surface and will not spread with that smooth, waxy appearance belonging to good butter. It is only when butter has this waxy consistency that it preserves that rich, nutty flavor and smell which impart so high a degree of pleasure in eating it. So it will be seen that there is very good reason for consumers rejecting butter that has been overworked into grease, even though it may have all the essentials of the best quality when taken from the churn.

A great deal of good butter is spoiled in the working. There are vast quantities of butter to be found in the markets, of good color, properly salted, the buttermilk expelled, and yet it has a mussy look and lardy taste. Consumers are often at a loss to account for it. The butter is not rancid nor has it any disagreeable odor, but it is poor nevertheless. This butter may have been made from the nicest cream, with the utmost attention to cleanliness in every branch of its manufacture, from the drawing of the milk to its packing in the firkin. The maker perhaps has expended all her knowledge and every resource within reach to get a prime article, hoping for a name in the market, and an advanced price for a really “tip-top” article. And when the expert affirms that the butter is inferior, and must be classed as second or third rate, it is very disheartening, and some give up in despair of ever learning the “knack” of manufacturing a strictly nice grade of goods. They cannot imagine why butter, upon which so much care and attention has been bestowed, should be condemned as having a greasy look and taste. If inquiry be made concerning the fault in manufacture, the dealer, if he be an expert, will be very likely to say, “My dear sir, or madam, your butter has no grain.”

**Coloring Butter.**—A rich golden color renders butter more marketable, as well as attractive for table use. As a general rule, good grass butter needs no coloring; but it is generally found necessary in winter to color butter, unless cows are fed largely on carrots, pumpkins, yellow corn meal, etc. Annatto is the substance most generally employed for this purpose. The pure article should be used, and when so, it adds nothing to the flavor of the butter, is free from sediment, and is quite harmless. It may be obtained in liquid form, prepared especially for dairy use. The quantity to be used must be determined by experiment, according to the season, conditions, etc. It should be put into the cream before churning, by which means it becomes uniformly mixed, giving the entire mass the same shade of color.

When the dry annatto is used, it should first be dissolved in warm milk or water, and strained through a cloth, to prevent the mixture of sediment. Deep yellow carrots are frequently used for coloring butter. The carrots for this purpose should be thoroughly cleansed, and the outside portion (which is of the deepest yellow color) grated and soaked in boiling milk for ten or fifteen minutes, and afterwards strained through a fine cloth and added to the cream. Carrots are thought by many to impart a sweetness of flavor to butter, resembling that obtained when cows feed upon grass, besides giving it a natural color.

**Packing Butter.**—When butter is to be kept for a considerable length of time, or transferred to a distance, it will be necessary to pack it in jars, firkins, or boxes. Stone jars are the best for this purpose, when the butter is to be used at home; but would be liable to become broken by transportation. When boxes and tubs are employed for packing, such

woods should be used in their manufacture as will not impart a disagreeable flavor to the butter.

Ash is regarded as objectionable, since it contains an acid; while spruce, pine, and other gummy woods impart a very disagreeable flavor to butter. Oak is highly recommended and extensively used for this purpose, but it should be thoroughly seasoned before using, as the sap exuding from the wood would impair the flavor as well as the color of the butter. Sugar maple is also excellent for this purpose. When properly steamed under a pressure, which process forces out the sap, many kinds of wood that would otherwise be objectionable may be used for this purpose.

Firkins and tubs should be prepared for packing by pouring boiling water into them and leaving them to soak twenty-four hours, after which fill with strong brine for two or three days; turn out the brine and rinse with pure cold water; then rub the sides of the tub with fine salt, and sprinkle a little salt in the bottom. As soon as the butter is worked, put it into the tub and pound it down solid. Fill the tub within an inch of the top; then cut a cloth one inch larger than the surface of the butter, wet it in brine and spread over; cover this with a layer of salt about half an inch; another cloth one inch larger than the first, and spread over, turning up the edges on the inside of the staves. Care must be taken not to let it hang over the top, as it will then draw out the brine. Fill the tubs with fine salt, fit the cover on tight, and pour strong brine through a plug-hole in it, in order to fill all the intervening spaces and exclude the air, after which put in the plug and keep the butter in a cool, dry, well-ventilated cellar.

Even butter that is packed in this manner will absorb gases from decaying vegetables and other foul odors, consequently it must be kept in a pure atmosphere. Some put a cloth in the bottom of the firkin before packing. Another method of packing preferred by some dairymen is as follows:

Make a bag of common bleached cotton cloth, a little smaller than the tub, so that when it is filled there will be a space of at least an inch all around on the sides, above and below. Pack the butter in the bag, and put the bag in the tub; fit on the cover with a hole an inch and a half in diameter in the centre; then turn in strong brine sufficient to fill the tub even full. Put in a plug reaching an inch below, so as to keep the butter under brine. The sack of butter will float in the brine and be excluded from the air. The butter should never come in contact with the cover in packing. In the preservation of butter, the exclusion of air is of the utmost importance. It is also highly essential that the buttermilk be entirely worked out before packing, as the casein contained in it ferments and causes rancidity.

**White Specks in Butter.**—Although there may be other causes for white specks in butter, they are caused mainly by the milk in the cream curdling while the cream is at too low a temperature, or from permitting the milk to become sour or curdled before skimming, and a portion of the same becoming mixed with the cream. Mr. H. Stewart says relative to this subject:

"The condition of the cow, caused by several circumstances, such as disturbed health from various causes, and the period of oestrus, will all produce this state of the milk; but these must all be so apparent that they would lead one to suspect their influence at once. I believe these white specks in butter are due in nine cases out of ten to the curdling of the milk in the cream, and the separation of the whey from it. Every time that I have had white specks in the butter the bottom of the cream can has contained clear whey, and of course the curd must have separated and have mingled with the cream. The white specks were all clearly apparent as the butter was taken from the churn in the form of small grains, and were evidently nothing more or less than clots of curd. If these had not been carefully picked out from among the grains of butter they would have been worked up among them, and have appeared as the ordinary white particles which trouble the butter-makers so often."

The remedy is, of course, to remove the cause, by skimming the milk before it becomes too sour, and to avoid keeping the cream so long or at so warm a temperature that the milk in it will curdle. We prefer sweet cream taken from sweet milk for butter, and believe no degree of souring, either for milk or the "ripening" of the cream, as it is termed, will produce butter of so good a quality as the former, although we are aware that a difference of opinion exists on this subject.

**Rancidity in Butter.**—Rancidity in butter may be corrected somewhat by melting affected butter and pouring it into ice-cold water. As a means of retarding rancidity, in some parts of France butter is melted and kept heated till the water it contains is evaporated, when the casein which appears as a scum on the surface is skimmed off; but the butter so treated loses much of its flavor.

To protect butter from rancidity, some dairymen, besides salting the usual amount, add white sugar and saltpetre, in the proportion of from one-fourth to one-third of an ounce of each to every pound of butter. Butter that has become rancid can be greatly improved by cutting it in very thin slices and putting it in a rotary churn two-thirds full of new milk, washing it thoroughly in this. New milk will dissolve and wash out the butyric acid. The butter should then be washed with very cold, pure water, and slightly resalted with the following preparation:—To every eight ounces of salt, add two ounces each of saltpetre, and the same amount of pure white sugar; mix these ingredients, and add from a half to three-quarters of an ounce of it to a pound of butter.

**Adulteration of Butter.**—Butter is of such a nature that it affords great opportunity for adulteration, and the rendering of the detection of foreign matters attended with considerable labor and difficulty. The chief adulterants are other animal fats, such as lard, beef, and mutton tallow, together with certain vegetable fats. Such adulterations may be suspected by their characteristic smell, and detected by their different melting points; by microscopical examination, and by their solutions. It can also be detected by the grain, oleomargarine never having that waxy appearance and fine grain that butter has, and will usually cut very different from butter, either being harder and more inclined to crumble, or to adhere to the knife like lard. When beef fat is used to adulterate butter, it renders it more hard and inclined to crumble; but when lard is used, it will be more liable to adhere to the knife. Professor Michels, a competent microscopist of New York, after subjecting oleomargarine to a thorough examination under the microscope in comparison with natural butter, says:

"It will be noticed that the large feathery crystals are characteristic of oleomargarine, and that the general appearance of the sample is different from that of butter, which merely shows the fat globules observed in milk, with here and there a crystal of chloride of sodium, or common salt.

Animals used for food are subject to the attacks of internal parasites that lodge in countless multitudes in all parts of their bodies. Some of the most dangerous forms of these pests will also live and thrive in man. The trichinae which enter the body, at once breed by the million, and invade the whole system from head to foot. *But one protection exists* by which man can guard himself from the contagion of these pests that annually carry off millions of the brute creation, and that is the practice of *thoroughly cooking all animal substances intended for food.*"

He also states in the same connection that in the process of manufacturing oleomargarine, it is never subjected to a higher temperature than 120° F., and that any germs of disease, morbid secretions, and embryos of parasites in the animals from which this oil is obtained are thus liable to be transferred in a living condition into the system of those who make use of butter made from such material. It is a well known fact that living organisms have withstood a temperature much higher than the caul fat is subjected to in the preparation of

oleomargarine, the germs having been found alive even at 190°, and that it is impossible to kill the animal life in beef fat at a temperature lower than 212°. One of the leading microscopists in the Western States says of oleomargarine:

"The greatest danger is, that much of the oleomargarine manufactured from refuse fats, may be a highway through which the eggs of animals, larvae of bees, etc., find their way into the stomachs of men. These eggs, larvae, etc., are known by the name of entozoa. They are formed by myriads in the intestines of many animals, and are only surely killed by a temperature of 212°. When these worms reach the stomachs of men, the embryo is liberated, and after penetrating the mucous membrane, it burrows its way, or is carried by the blood currents, to some distant organ, where it is lodged, but presently reappears as a hydatid vesicle. It is manufactured in immense quantities and sold to dealers, who mix it with real butter, and sell it as such. The men who mix it and sell it thus fraudulently are the ones who ought to be punished."

Not only should those who sell this spurious article be subject to the penalty of the law, but those who manufacture it and put it upon the market. The manufacturing and circulating of counterfeit money is prohibited by law, and those who violate this law are punished by the penal laws of the country, and we see no reason why those who make and sell spurious butter or any other article of food, drink, or medicine should escape punishment for that which should be regarded as felony in law,—a felony of a far more serious character, and requiring severer penalties than the laws impose respecting those who counterfeit money, or knowingly issue the same, the gravity of the offense respecting counterfeits or adulterations of butter, or other foods, drinks, or drugs, or *issuing the same, knowing them to be counterfeits or adulterations*, being very properly measured by the probable consequences to the public health and the average duration of human life, through the use of these noxious compounds.

The experts of oleomargarine are nearly equal to those of butter in this country, and this fraudulent article is what the dairymen have had to contend against for several years, to the great detriment of the dairy interests, and the reputation of American butter abroad.

**English Butter-making.**—One of the highest authorities in dairy matters in England recommends the following method of butter making, which he says is adopted in the best districts of Normandy, the butter from which sells at the highest price in the Paris market: "Clean all dairy utensils, first in cold water, secondly in hot water, and again in cold water. Cool the milk by placing the cans in cold running water; then set it in deep pans at a temperature not above 55°; skim with a perforated skimmer after setting twelve hours, using care that only cream is taken off. A second skimming may be taken twelve hours afterwards; but this is not to be mixed with the first. The largest quantity of butter does not give the best quality—therefore make two qualities.

The best butter cannot be made of cream from sour milk. Churn the cream at a temperature of from 57° to 60° in a revolving barrel churn, making forty to sixty revolutions per minute. The churn should be ventilated often during the first ten minutes. Learn by the sound when the butter has come in globules the size of a pin-head, then draw the buttermilk. [Some American authorities say that the globules should be as large as a pea.] To prevent loss, pass the buttermilk through a hair sieve. Wash the butter well with cold water till the water comes off clear. Press out the water in the butter-worker and add salt in the proper proportion."

**French Butter-making.**—By the French system, butter is made from very sour cream, is washed in pure water in the churn, and being for the most part sold for present use in the home market, no salt is used. The best French butter is shipped at once to the consumer. It is put up in large balls of twenty-eight pounds to forty pounds, each ball being covered by a piece of fine flannel and placed in a willow basket. Second and third class butter

is made up in one pound rolls and placed in grape leaves. For the English market, butter is put up in one pound rolls and covered with jaconet and lace paper, and packed in small boxes 14 x 9 x 6 inches, twelve rolls in each box. M. Lepelletier, the largest exporter of this kind of butter, ships it in refrigerator cars at the rate of 12,000 boxes per week. The different kinds of butter are named from the places where they are made, and classified according to quality.

**Philadelphia Butter.**—The manufacture of the famous "Philadelphia print" shows that great care, uniformity, and system characterize all its processes. The milking is done quietly and rapidly, the same milkmaid always attending to the same cows. The spring-house is usually of stone, on a side hill, the floor covered with running water, and therefore always cool and free from odors. Deep tin pans, painted on the outside, with bails for handling, are filled to the depth of three inches, placed on an oak floor, and surrounded with cool, clear water of a temperature of 58°. The cream is taken off in twenty-four hours, kept in deep vessels holding twelve gallons, and stirred whenever a new skimming is added. A barrel churn is used, the churning lasting an hour, when a little cold milk is added to cause the butter to gather. The buttermilk drawn off, ice-cold water is twice added, a few turns given to the churn each time, and the last water is scarcely colored with milk. A gentle, rocking motion of the churn soon collects the butter, which is left two hours to drain off the remaining water through a small hole made for the purpose. The butter is worked by a corrugated wooden roller, revolving on a shaft supported over the centre of the table, which also revolves under the roller. Beveled blocks at each end of the roller force the butter from the ends toward the centre, so that the rolls are broken each time in fresh places. The roller does not quite touch the table, and there is no crushing of the particles, but a separation of the mass with a slight pressure which permits water or buttermilk to flow away. A cloth which has been wrung dry in cold spring water is repeatedly pressed upon the butter until not a particle of moisture is seen upon it as it comes from the roller, and the butter begins to adhere to the cloth. This is called "wiping" the butter. An ounce of salt to three pounds of butter is then thoroughly worked in by the aid of the same machine. Thus the processes are all conducted without any manipulation of the butter by the human hand. It is finally weighed out and put up in pound prints. One hundred pounds are churned in one hour and prepared for market in another, and deposited in tin trays and set in water to harden. The next morning it is wrapped in damp cloths, each pound by itself, put in a tin case upon wooden shelves, with two compartments of pounded ice to keep it cool, and surrounded by a thoroughly made cedar tub; it is sent to market, and often sold at a dollar a pound.

**Butter Yields, or How Much Cream for a Pound of Butter.**—The proportion of butter produced by milk varies largely according to the breed, season, feed, etc. According to Willard's statement, it is usual to reckon twenty-five pounds of milk for a pound of butter, as an average from the common cow. Some factories report a pound of butter from twenty-two pounds of milk, and some even less. It must be remembered, however, that *fat* is the chief variable constituent of milk, depending largely on breed of cow or selection, food, etc. When we speak of a pound of butter from twenty-five pounds of milk, we assume there has been no particular selection of the common cows as butter producers, and that they are fed upon grass alone, or with no extra feeding to stimulate an extra yield of butter.

The editor of the *National Live Stock Journal* gives the following report concerning the butter yield of cream, which contains so much valuable information that we quote it entire:

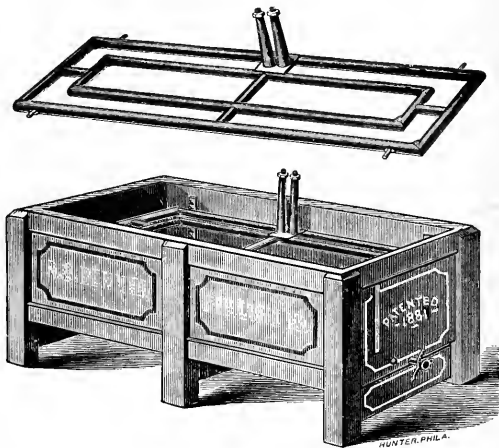
"In the Fairlamb system, and in others similar to it, 113 cubic inches, or almost two quarts, are taken from the patrons of a creamery for one pound of butter; and the average result proves this quantity to be nearly correct. It oftener falls short than overruns, so that two quarts, which measure 115½ cubic inches, would be nearer the measure required. This

is the result in *one* mode of raising the cream. Every variation in the mode of creaming milk varies the quantity required for a given weight of butter. The more refrigeration there is used, the more cream for a pound of butter, because in the cold processes the milk is less perfectly separated from the cream. When raised at a high temperature, as when the milk is scalded before setting, the separation of the cream is very complete. The cream is then almost pure butter, and it takes but a little more than a pound of cream for one pound of butter. When raised in the open air at 60°, the bulk of cream is between the extremes. Thus it will be seen that the value of cream is a very indefinite quantity. It depends altogether upon how much milk goes with it, and this, in turn, depends upon the manner of raising and skimming. People are quite prone to speak of cream as if it was a single and uniform substance, composed only of the fat globules of the milk; but we never, or very seldom indeed, get it in such a state, it being always more or less mixed with milk. Cream varies also in its value for butter production, on account of the breed of cows from which it is obtained. Derived from Jersey milk, its separation from the liquid part of the milk is very complete, by reason of the very large size of its cream globules, which come to the surface quickly, and with less liquid adhering to them. Then cream from Ayrshire milk is usually very compact, being composed of large and small globules mixed, the smaller ones filling in and occupying the spaces between the larger ones, just as small potatoes or small apples fill in between larger ones, and give more weight to a given bulk than if measured separately. In one case, 100 lbs. of Jersey cream produced 56.8 lbs. of butter, while another sample of cream from common stock gave only 18.18, which is less than one-third of the yield from the Jersey cream. These are extreme cases, but inside of these extremes the value of cream for butter making is continually oscillating one way and the other, so that it is impossible to give it any specific value either by weight or measure.

There are some curious things about cream not well understood, which stand in the way of making any definite inferences from its bulk or weight. Two samples of cream, showing by exact analysis the same percentage of fat, are liable upon churning to yield very unequal quantities of butter. This is so generally true that there would be no more reliance upon a chemical analysis of cream to determine its value for butter than there would be upon estimating it by its bulk. Neither will an analysis of a sample of milk afford anything more than a vague and uncertain indication of the percentage of cream which will rise on it, or of the butter it is capable of producing. It is as useless to analyze milk with a view to finding out how much butter it would make, or how much cream would rise on it, as it would be to analyze a soil to find out how much grain it would produce. The uncertainties which are thus seen to attach to cream suggest very forcibly that the percentage which may rise upon any particular specimen of milk can be no certain indication of the capacity of that milk for producing butter. The variations in the butter product from a given percentage of cream have been found in individual cases to vary from 300 per cent. down to nothing—that is, the product of butter from a given percentage of cream upon two samples of milk may be alike, or one may be three times as great as the other. In the case of the mixed milk from any considerable number of cows, these individual idiosyncrasies balance each other, and give a pretty uniform result. Dairywomen are sometimes advised to test their cows' capacity for butter making, by setting their milk separately and noting the percentage of cream which rises on each, and to reject those which give a small depth of cream; but such a course might drop out the best butter cow in the dairy. The cream or milk should be churned, and the comparison made between the butter products instead of the cream. The lack of uniformity in the value of cream is well indicated by the variations in its specific gravity. Hardly any two observers make it alike. Thus, with water at 1,000 as a standard, Berzelius made the specific gravity of cream 1,024.4; Dr. Voelcker, 1,012 to 1,019; Letheby, 1,013; Henneberg, 1,005.5; L. B. Arnold, 985; Dr. Sturtevant, 983. These widely differing results have

doubtless been obtained by reason of unequal admixtures of milk with the samples tested. The gravity of pure cream should not differ much from pure butter fats, which have a specific gravity of about 945. They are lighter than water, and so is sweet cream, for it always floats on water. Occasionally sour cream, by being loaded with sour milk, sinks in water; but it would not do so except for the milk with which it is entangled. Jersey cream, which separates quite perfectly from the milk, is often more than half butter, while the cream which produces but 18 per cent. of butter must be largely diluted with milk. As the gravity of pure cream must be less than that of water (1,000), since it floats upon water, and as the gravity of whole milk is but 1031, it must be evident that the cream examined by Berzelius was more than three-fourths milk, and the records of Voelcker and Letheby must be based on samples of cream composed of milk to the extent of one-half or more. With such an ever-present uncertainty in the actual composition of any sample of cream, the only sure way of determining its real value is to churn it."

**Creameries.** — By "creamery," in the common and generally accepted meaning of the term, is meant the aggregation of large quantities of milk from many farms, thus cheapening the cost of butter, and producing an article of uniform quality. The small creamery is, in fact, only a large dairy, and managed on precisely the same business principles as the large creameries, but only on a different scale, requiring the same kind of apparatus and the same methods. The advantages which creameries afford over private dairies are becoming more and more appreciated by the public, as is evidenced by the many thousand establishments of this kind in the United States, with the number rapidly increasing, causing private dairies to be supplanted by the former all over the country.



COOLING VAT FOR SETTING MILK.

There is probably no one article of food which comprises so many grades, from the very poorest to that of the finest quality, as butter; and none of which there is so large a proportionate quantity of a poor grade manufactured as this, which is such a delicious article of diet when properly made. A reliance upon uniform quality in butter increases its value.

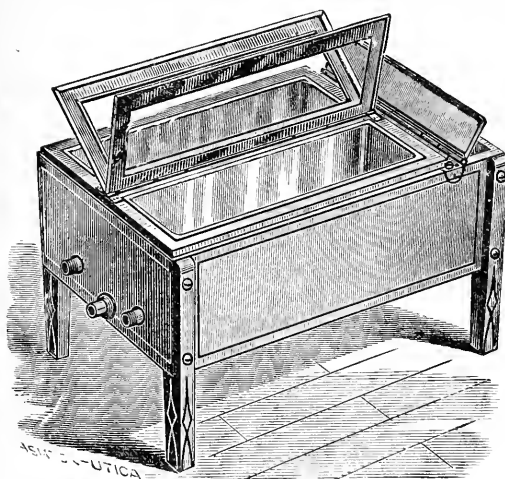
The high degree of perfection that has been attained in our first class creameries in butter making, has caused such butter to be in great demand, and to command the best price in the market. Butter making has, in fact, been reduced to a science, and experts have become so numerous that we expect to find one in every creamery, although we cannot expect to find one in every private dairy. Creameries also save much of the labor that was formerly performed in the farmer's house by his wife and daughter, relieving them of much of the drudgery that was necessarily associated with every farm dairy.

There is no reason, however, why, with a well-appointed dairy and skillful management, as high a grade of butter, or even higher, cannot be thus produced, than can be manufactured in a creamery, since a better quality of milk might be obtained from a choice herd of cows than

where a large number of dairies are massed together; besides the objections to the transportation of the milk or cream would be avoided, milk usually depreciating somewhat by transportation. But unfortunately, model private dairies are very rare, as the dairy products found in the markets everywhere clearly prove; and taking all things into consideration, there can be no possible question but that the creamery system, as at present carried on, is a great improvement upon the old method, which resulted in about as many grades of butter being put upon the market as there were dairy farms in the country, the majority of the quantity being exceedingly poor, and what might be termed "dairy grease."

The great mass of the butter of the future will doubtless be made by creameries, a fair proportion of it being now so manufactured, for over them will be exercised an intelligent supervision, directed by the improvements resulting from the experiments and labors of the specialists, who devote so much time in ascertaining the best methods of butter making, while a sufficient amount of capital necessary to the carrying out of the constant improvements in the process will by this means be employed.

Butter when produced of uniformly good quality by creameries, soon acquires a reputa-



EXCELSIOR COOLING VAT.

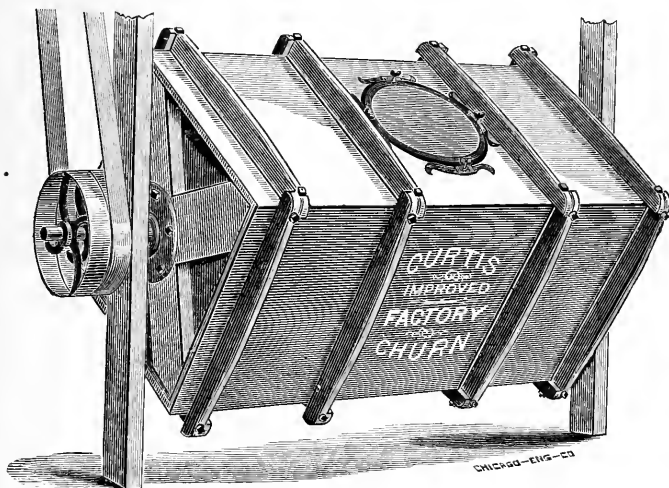
tion, and there is a demand for it which renders its production attended with such profit as induces corporations of associated dairymen to be formed, and largely increases the number of such establishments. From the many thousands of creameries in the United States and Canada, and from the general uniformity and constantly increasing popularity of their products, it will not be surprising if in a few years in advance of the present, it will be as difficult to find a churn or a milk pan in a farm house, as it is now to find a spinning wheel or a loom. Of course the system of manufacturing will have to be arranged to meet the special

conditions. A writer familiar with the creamery system of management gives the following outline of a plan for a small creamery suited to the manufacture of both butter and cheese, adapted to a hundred cows. In this plan it will be seen that arrangements are made for setting the milk, and not for collecting according to the Fairlamb system; hence, it will of course need to be modified to suit the special requirements and conditions, whether butter only be made, or both butter and cheese, it being understood that a large creamery suitable for a thousand cows can be managed much more economically in proportion, than a small one; for instance:

"The owner of a butter dairy farm of 20, 30, or 50 cows must necessarily make use of all the labor-saving methods of the creamery, and it costs little more to do the work for 100 cows, and scarcely any more for apparatus, than for 50. He may as well, then, gather in the milk of his neighbors and add this to his own and work all together. In doing this it will probably be better to purchase the milk at a stated price than to take it in any other way.

Certain regulations and restrictions as to the feeding of the cows and the quality of the milk will be necessary to secure fair treatment of the dairyman, but these will be easily made as experience proves them to be necessary.

The first consideration would be the building and its arrangement, the next the furnishing of the creamery, and lastly the method of operation. The arrangement of the building will necessarily depend upon the system of setting the milk, and this will depend upon the supply of water and ice. Ice is an absolute necessity for modern dairying and for either deep or shallow setting. The deep setting requires the least room, for a pail holding 20 quarts will occupy only nine inches of horizontal space. For 100 cows 50 cans only will be required, because with cold setting the whole of the cream is raised in 12 hours, and two settings only will be required at once; 50 cans will hold 1,000 quarts, which may be expected



RECTANGULAR FACTORY CHURN.

to yield 100 quarts of cream, and in the best of the season 75 to 100 pounds of butter. These 50 cans will need but a space of 100 by 50 inches, or four refrigerators, each having a floor space of about 50 by 25 inches.



BUTTER TRIER.

There is no other system of setting milk so economical of room, cost, and labor. A building, then, of this capacity would need to have a milk-room no larger than 16 square feet; an ice-room of the same size; a churning-room and work-room 12 by 16, and a cheese-room of 24 by 16; in all, a building of about 32 by 16 feet, with an addition in the rear of 12 feet wide, and an ice-house at the end.

There should be no communication between the milk-room and the cheese-room, and the ice-room should communicate directly with the milk-room. The milk-room should be

made with double walls to preserve an even temperature and to save the consumption of ice. The floor of the milk-room should be of concrete; the house, if of wood, should be built upon an underpinning of brick or stone, 18 inches above the ground; and if the milk-room were sunk three feet below the surface it would be desirable. The floor of the churn-room and cheese-room should be of closely jointed plank, so that they could be washed off every day, and a drain should be made to carry off the waste water.

The cooling vats for setting milk, manufactured by Childs & Jones, of Utica, New York, (to whom we are indebted for permission to copy many of the cuts of improved dairy implements in this department from their catalogue), are designed for large dairies and creameries. The first represented is arranged for cooling milk by passing cold or ice water through a

series of cooling pipes or coils, carrying the water first through the outer or exterior coils or pipes, and then through the inner coils or pipes, as illustrated by the diagram.

The second vat is double, with ice tank at the end. There is an arrangement of water pipes inside through which water may be run or forced, cooling the milk rapidly and causing a full yield of cream. Steam pipes are also placed underneath to be used when required. Cheese can be made in these vats also.

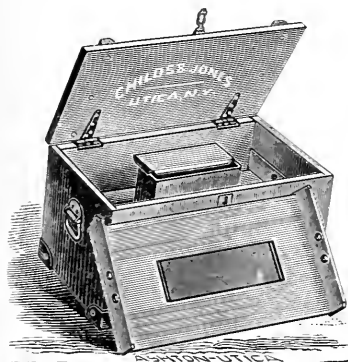
The butter box and cooler is designed for shipping butter to market during warm weather. When properly packed, but little ice being required, butter can be transported several hundred miles in good condition.

The rectangular factory churn, manufactured by Cornish & Curtiss, Fort Atkinson, Wisconsin,

is a revolving churn with no dasher. These churns are designed for large dairies or creameries, and are made from twenty-four to thirty-six inches square, of any desired length, and to hold from sixty to five hundred gallons.

**Inauguration of the Creamery System.**—To Jessie Williams, a well-to-do farmer living near Rome, New York, is accorded the honor of being the originator of the creamery system. It seems that some had tried the plan before him, but were not successful in inducing others to follow their example. This gentleman was an experienced and skillful cheese maker, always obtaining the highest prices for his cheese. In 1850 his son was married, occupying a farm not far from home. Looking to his son's interest as well as his own, Mr. Williams marketed the cheese that was made on both farms; but subsequently, being in doubt as to his son's ability to make cheese of the desired quality, it was arranged that the father should make the cheese for both farms by going to his son's farm for that purpose. As this plan caused much inconvenience and loss of time, it was supplemented by carrying the milk from the son's farm to the milk-house of his father's dairy; other neighbors eventually combined in the enterprise, and thus was established the associated dairy business.

The progress was at first slow, as is usual in any new enterprise. In 1860, about thirty-eight creameries were erected; by the end of 1866, five hundred factories were in operation, the cheese factories being almost exclusively devoted to the manufacture of cheese, butter, and skimmed milk, or skimmed milk cheese. In 1872, the number of factories in New York State alone was estimated to be over one thousand, and in 1882, to be fully two thousand.



BUTTER BOX AND COOLER.

Great advancement in the dairy interest has been made in the Western States during the past few years. It is estimated that in the State of Iowa alone a hundred and fifty cheese and butter factories were erected in 1881, making at that time nearly six hundred in that State. It is estimated that over six thousand creameries and cheese factories are now in operation in the northern portion of the United States and Canada, with probably between two and three millions of cows contributing to them.

**Measurement of Cream.**—The general rule for cream measurement in creameries on milk when set twenty-four hours, is one hundred and thirteen cubic inches for a pound of butter.

At the sixth annual convention of the Iowa Butter and Cheese Association, held at Board of Trade Hall, in the city of Cedar Rapids, February 22, 23, and 24, 1882, Messrs. C. A. Huston, President of the Cedar Rapids Board of Trade, H. H. Markley, President of the Iowa Butter and Cheese Association, and I. H. Wanzer, of Elgin, Ills., expert in dairying (old and new process), were appointed a special committee to report on sizes of milk setting cans, and the relative depth of cream necessary to give 113 cubic inches, the quantity estimated to produce a pound of butter. The committee gave the subject their special attention, and reported to the convention the following resolution, which was read and adopted:

*Resolved*, That, as it requires 113 cubic inches of cream on milk when set 24 hours, and set in deep setting cans, to make 1 lb. of butter, the measurement of cream should be as follows: For cans 12 inches in diameter, 1 inch depth of cream; for cans 8 inches in diameter,  $2\frac{1}{4}$  inches depth of cream; and for cans  $8\frac{1}{2}$  inches in diameter, 2 inches depth of cream to make a pound of butter. The milk to be set in a temperature not below 50 degrees nor above 60 degrees Fahrenheit, and not less than 24 hours before being skimmed. The standard of measurement shall be as here recited, and it is recommended that all cans be made to conform to these dimensions. This measure for cream does not in any way apply to the shallow setting system.

**The Lactometer.**—The use of the lactometer, when properly understood, will be found a valuable aid in protecting against fraud so often practiced in diluting and skimming milk. The following from the *National Live Stock Journal*, explaining the use of this instrument, will be found of value to dairymen, and those having charge of creameries and cheese factories.

“In our intercourse with dairymen and factory men, we frequently meet with those who omit to use the lactometer, from not having a clear conception of how its indications are made significant. Its operation, however, is quite simple when once clearly comprehended. In the first place, it should be distinctly understood that each instrument is made to be used in milk at some certain temperature, generally 80°, and the first thing to be done is to see that the milk to be tested is at the right temperature. The milk for testing is best held in a narrow glass jar, deep enough to float the instrument in it with some room to spare. The lactometer is then to be carefully put into the milk, so that it will not sink much below the number 100, which is the point to which it should settle to indicate pure milk. If the operator lets go of the stem of the lactometer much before it has settled to the pure milk point, milk is apt to adhere to the stem, and the little extra weight thus added will make it too heavy, and it will sink too low to be exact. Care should therefore be taken to keep that part of the stem which rises above the milk dry. The operator has then only to observe the point on the stem which, when it has come to rest, is at the surface of the milk, to determine whether the milk is right, or too light, or too heavy. If the line marked 100, which is also usually marked P., is at the surface, it is supposed to be right; if the stem sinks lower than P., the milk will be unusually light, and watering may be suspected, according to the depth to which it sinks. Since the stem sinks to 100 in pure milk, and in pure water to 0, usually marked W. near the

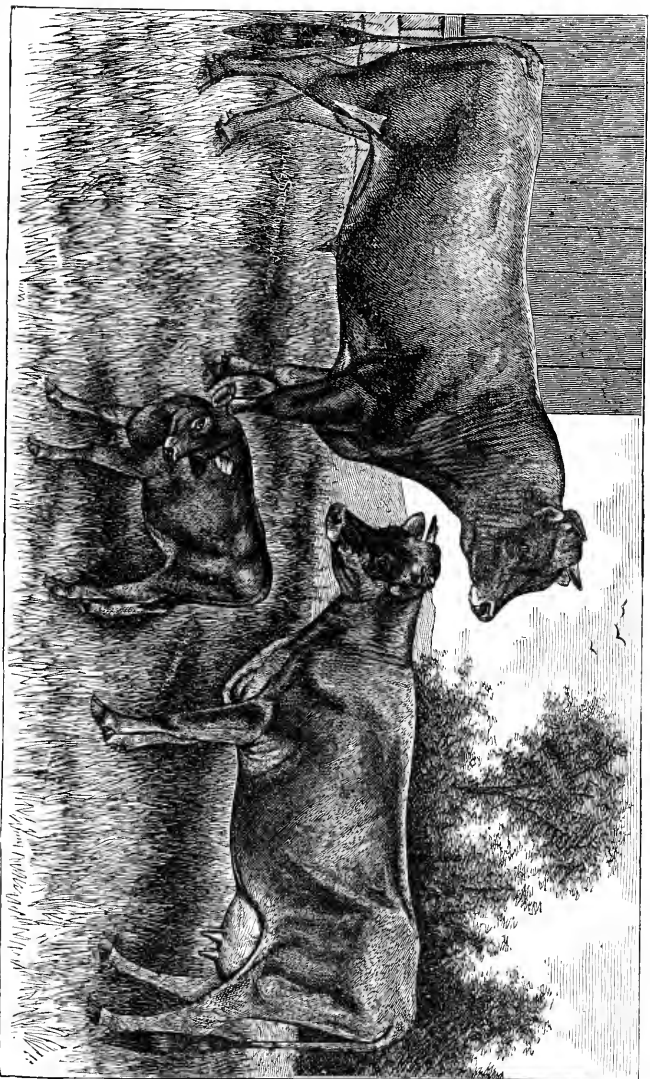
top of the stem, if milk and water are equally mixed the stem will sink to a point half-way between 0 and 100, namely, 50. If milk and 10 per cent. water are mixed it will sink to 90. If 20 per cent. of the mixture is water, it will sink to 80, and so on according to the amount of water added. If the operator has been careful to have the milk tested at the proper temperature, and he finds the lactometer sinking more than 3° or 4° below 100, he may fairly suspect water to the amount indicated has been added.

As cream is lighter than the liquid part of milk, if it, or any part of it, should be removed, it would leave the remainder, or skim milk, heavier than normal milk. When fully skimmed, it becomes heavy enough to cause the stem to rise to about 110. If half the cream has been removed it will bring the line representing 108 at the surface of the milk; removing one-fourth of the cream to 104, and so on, according as more or less of the cream has been taken off. If in testing milk the operator finds 100 rising more than 2° or 3° above the surface of the milk, he may reasonably suspect skimming has been done, according to the extent to which the stem rises out of the liquid.

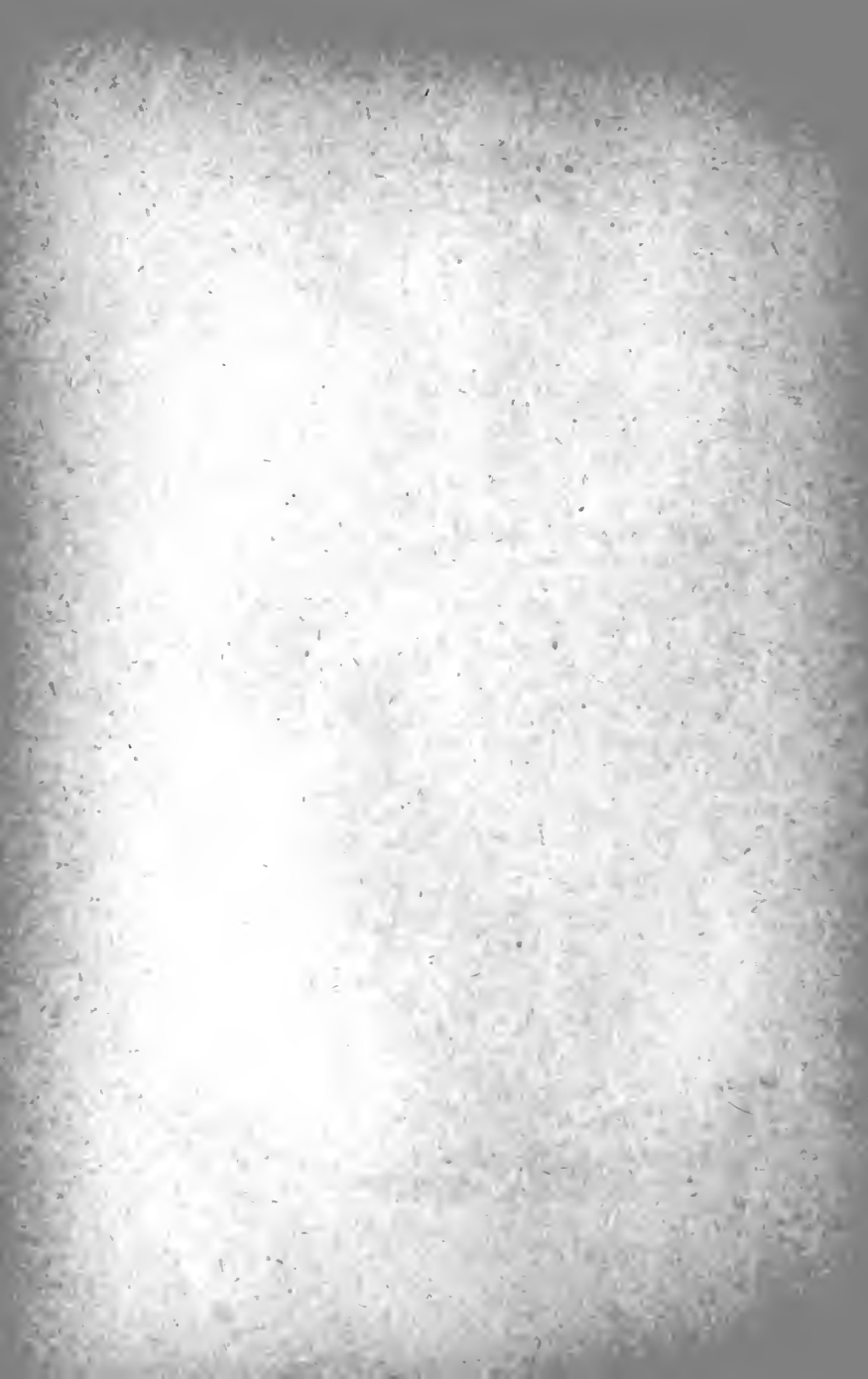
The operator should keep constantly and distinctly in mind that the function of the lactometer consists solely in showing whether the sample of milk tested has the same gravity as, or is lighter or heavier than, average whole milk. Its significance arises from the fact that milk is heavier than water, and if water is added to it, it becomes lighter than it was before. When, therefore, the lactometer shows milk to be lighter than usual, it gives grounds for *suspicion* that the sample has been watered. Because skim milk is heavier than average whole milk, if the lactometer shows a sample to be heavier than whole milk, it affords grounds for *suspecting* it has been skimmed. It proves nothing, because it would have given the same showing if the milk had been made lighter or heavier than usual from any other cause than watering or skimming. Cream, as well as water, is lighter than milk, and if a sample contained more cream than average milk, it would give just the same showing by the lactometer as if water had been added to average milk.

On the other hand, since sugar or salt is heavier than milk, if either of these substances was dissolved in whole milk it would make the milk heavier than usual, and the lactometer would rise in it just the same as if it had been skimmed. Though the lactometer is a very sensitive instrument, and discriminates with great exactness between the gravities of samples of milk, it is a blind guide, and, like all blind parties, is easily cheated and liable to go astray, and its testimony should not be implicitly taken without corroborating evidence. Should it show milk to be very much lighter than usual, watering would be very evident, and the lactometer, like a blood-hound, would lay on the track of the rogue, but it would not convict him, because it could not testify as to the cause of the unusual levity, it could only testify it was too light, from which fact *inferences* might follow. The same uncertainty would exist if milk was found too heavy. It might be skimming, or it might be something else that made it so.

The creamometer, cream-gauge, or cream-tube, as it is variously called, should **always** be used in connection with the lactometer. It consists of a graduated glass jar for showing the percentage of cream which rises on the milk within it. If the percentage of cream which rises on a sample of milk diminishes at the same rate its gravity decreases, as shown by the lactometer, dilution becomes evident enough to convict. If the percentage of cream was greater than usual, it would show that the sample was light from unusual richness in cream. So when milk tests heavier than usual, if the cream diminishes as the gravity increases, skimming would be proved, but if the usual percentage of cream appeared in the creamometer, it would be considered certain that the unusual gravity was from some other cause than skimming. It is not safe to dispense with the use of the cream test, even when the lactometer indicates pure milk, because it may be so easily cheated. The rogue who knows that skimming milk makes it heavy and watering makes it light, may, after skimming, water



JERSEYS, "ONE TON" and "MORA."  
Property of Churchman & Jackson, "Beech Grove Farm," Indianapolis, Ind.



ms milk enough to make it just as heavy as whole milk should be. The indications of the lactometer would show such milk to be pure, though it was both skimmed and watered, but an appeal to the cream-gauge would detect the whole fraud.

The indications of the lactometer are often objected to because the milk of individual cows show wide variations in specific gravity when tested with that instrument. There would be a good deal of force in these objections if the tests were confined to the milk of single cows, for it is well known that there are cases in which the tests have shown deep skimming and as high as 16 per cent. dilution in milk as it came from healthy grass-fed cows. The utility of the lactometer in connection with the cream gauge is based upon the equally well known fact that, in the milk of a herd of any considerable number of cows, the individual differences are equalized, and the gravity of the average is very uniform. It is rare indeed for the collective milk of even a half dozen cows to vary more than .02 of the difference in weight between milk and water, except when some very unusual feed or treatment is present to account for a wider change. In view of this acknowledged uniformity in the milk of herds, and the fact that it is upon the milk of herds only that there is occasion to employ it, its use in the hands of the factory men and milk experts is regarded as a valuable aid in protecting against frauds in both dilution and skimming, and should be in frequent use in every cheese factory and creamery."

**Cheese Making.**—Cheese is a solidified preparation from milk, the essential constituent of which is casein, besides which all cheese contains some preparation of fat or butter, and in the more rich and choice varieties this often exceeds the casein in amount. Cheese may be made from the milk of different animals, that of the cow being principally employed; it is, however, made to a certain extent in some countries from the milk of the goat and ewe. The richness and flavor of the cheese, as with butter, will vary with the animal, the breed, the feed, and many other attending circumstances; the object in cheese making being to obtain, in a solid form, as large a proportion of the casein and butter in the milk used as possible. If, after the cheese is made, the residuum of whey remaining shows a lack of casein and fat or butter, the manufacturer may be assured that he has succeeded in extracting, by the process, these elements from the milk. The average composition of whey drained from cheese is estimated as follows: Water, 92.95 per cent.; butter, .24; casein, .81; milk, sugar, and lactic acid, 5.27; and mineral matters, .73 per cent. Cheese, as an article of food, is highly nutritious, being rich in bone and flesh-forming material; it also contains fat and heat-producing properties.

Cheese also extracts more from milk than butter, and consequently better economizes the use of milk, the average quantity produced being, as estimated by Prof. X. A. Willard, about ten pounds of cheese to a hundred pounds of milk; and the average butter yield, with common cows, one pound of butter to twenty-five pounds of milk. The amount of milk manufactured into cheese in this country, in comparison with what is made into butter, is estimated by reliable authority as being one pound of milk made into cheese for eight pounds made into butter. There is a large amount of cheese of poor quality thrown upon the market, such a product being a very imperfect food, and actually unhealthy for many; while cheese of a good quality, properly manufactured, is a healthy article of diet and a more valuable food than butter, butter being composed of only heat and fat-producing matter, with but a slight amount of material for building up or sustaining the animal frame-work and tissues.

The great bulk of cheese made in this country is made too dry and hard to be palatable, and too sour and indigestible to be healthful. It is doubtless owing to the lack of skill in the art of manufacturing cheese that so small an amount is made in this country, in comparison with butter. If this important branch of dairy industry is to be conducted on an extensive scale, we believe it to be for the farmer's interest to patronize a cheese factory, if

practicable, thus securing a uniform product of a better quality, as well as a larger amount than would be produced from the same quantity of milk in the dairy, as the latter is commonly managed. The same essential advantages are to be derived in the manufacture of cheese by patronizing the cheese factory as from the creameries in the making of butter, the factory product being usually of good, uniform quality, better flavored, commanding a higher price in the market, while a larger quantity of cheese can also be made from the same amount of milk than can be obtained in the farm dairy. The labor of cheese making is all obviated in the farmer's home by this system, an item of no small importance to the farmer's wife and daughters, who have much of the heavy work of the dairy to perform upon the farm. If there is no cheese factory in the vicinity at a convenient distance to make its patronage profitable, it would be a good plan for the farmers to unite in establishing one, which, under proper supervision and skillful management, would prove a profitable investment.

**Varieties of Cheese.**—The different kinds of cheese that are produced on the farm are made from the whole milk, or that which is new and has not been skimmed; that from a mixture of one-half new milk, while the other half has stood twelve hours and had the cream skimmed off that has raised during that time; and that from which all, or nearly all, the cream has been removed, commonly known as skimmed-milk cheese. Of these different kinds, of course the first, when properly made, is the best, being rich and of fine flavor. The second is considerably less rich than the first, and of medium quality. The third is generally of poor quality, being devoid of cream, and consequently of the butter element, and is usually hard and indigestible.

English cheese is divided into three classes: (1) that which is made from whole milk, with an addition of cream; (2) that made from whole milk; and (3) that made from skimmed milk. The far-famed Stilton and Double Gloucester cheese belong to the first class mentioned, being made of morning's milk, to which the cream of the previous evening's milk has been added.

The different kinds of whole-milk English cheese are known as Single Gloucester, Cheshire, Cheddar, and Dunlop.

The third class, or skimmed-milk cheese, is of the lowest grade of the English product, and is the cheese commonly used by the laboring classes. Besides those already mentioned, there are other varieties more or less common, among which is the Neufchatel, or cream cheese, which is made of pure cream, and the Gargonzola, an Italian variety. The former will not keep well, and must therefore be eaten while it is fresh, or soon after being made; the latter is quite rich, and similar to the Stilton. The quality of the different kinds of cheese depends much upon the mode of manufacture and other circumstances, besides the proportion of butter they contain. An English writer of prominence says with respect to the imported American cheese: "Of foreign cheese imported into Great Britain, the most important in point of quality and value is the American; and, since the introduction of the factory system of cheese making in the United States, this has greatly improved in quality, and become an important and extensive article of commerce." This is certainly important testimony from English sources.

Of course the milk of different breeds and herds of cows will differ in quality, some milk being much richer in both the butter and casein elements than others; but we believe the different qualities of cheese found in the market are due more to the skill, or lack of it, of the manufacturer than in the quality of the milk used. We have eaten skimmed-milk cheese in which that skill was employed in its making, that brought out and utilized the fullest excellence of the material used to such a degree that it was in quality greatly superior to whole-milk cheese manufactured by inferior skill. Much depends upon the quality of rennet used for curdling the milk, the pure, chemically-prepared extract of rennet being the

best. The milk and curds should also be worked sweet, souring to be avoided. The prolonged aeration of the warm curds before pressing likewise adds to the richness of the cheese.

The following table, compiled from various reliable sources, shows the average composition of the principal kinds of cheese known to commerce:

ANALYSES OF DIFFERENT KINDS OF CHEESE.

|                                  | Water. | Casein. | Fat.  | Milk, sugar,<br>etc. | Ash and<br>common<br>salt. |
|----------------------------------|--------|---------|-------|----------------------|----------------------------|
| Stilton, .....                   | 20.27  | 33.45   | 43.98 | ....                 | 2.20                       |
| Cheshire, .....                  | 32.59  | 26.06   | 32.51 | 4.53                 | 4.31                       |
| Cheddar, .....                   | 30.32  | 28.18   | 35.53 | 1.66                 | 4.31                       |
| Double Gloucester, .....         | 33.41  | 27.75   | 32.69 | 2.23                 | 3.92                       |
| Single Gloucester, .....         | 36.50  | 25.75   | 28.75 | 4.68                 | 4.32                       |
| Wiltshire, .....                 | 39.22  | 34.22   | 19.26 | 2.28                 | 5.02                       |
| Dunlop, .....                    | 38.46  | 25.87   | 31.86 | ....                 | 8.81                       |
| Ordinary skim-milk, .....        | 39.43  | 30.37   | 27.08 | 0.22                 | 2.90                       |
| American, .....                  | 27.29  | 25.87   | 35.41 | 6.21                 | 5.22                       |
| Dutch (Gouda), .....             | 36.10  | 29.43   | 57.54 | 6.94                 | ....                       |
| Camembert, .....                 | 51.94  | 18.90   | 21.05 | 4.40                 | 4.71                       |
| Parmesan, .....                  | 27.56  | 44.08   | 15.95 | 6.69                 | 5.72                       |
| Gruyere, .....                   | 40.00  | 31.50   | 24.00 | 1.5                  | 3.00                       |
| Brie, .....                      | 45.25  | 18.48   | 25.73 | 4.94                 | 5.61                       |
| Roquefort, .....                 | 31.55  | 26.52   | 30.14 | 3.72                 | 5.67                       |
| Neufchatel (cream cheese), ..... | 36.58  | 8.00    | 40.71 | 15.80                | 0.51                       |

**Stilton Cheese.**—This is a rich, fine-flavored cheese, much prized in England, as well as other countries. It was formerly made by adding an extra amount of sweet cream taken from the previous night's milk to the morning's milk; but it seems that a new method of its manufacture has, within a few years, been adopted, as will be seen by the following from Prof. Willard, to whom previous reference has been made:

“Among the small cheeses of great renown, and universally esteemed both at home and abroad, is the Stilton. That it has not been more extensively produced in America has been owing to a lack of knowledge as to its manufacture, and a supposed difficulty in adapting its manufacture to our factory system.

Stilton is a rich, meaty cheese, and as originally made required an extra measure of cream, obtained by robbing the night's mess of milk of its cream to enrich the morning's milk, which was then converted into Stilton. Upon this plan the night's milk, robbed of its cream, was left to be turned into skimmed cheese, thus necessitating the manufacture of two kinds of cheese from day to day; one of which, being inferior to the whole-milk variety, must be sold at a less price. This loss could only be met by a very high rate on the Stilton to compensate for the making, and especially as the trouble and expense of manufacture were also enhanced over that of the common sorts.

What was needed in the production of Stilton was that its manufacture be adapted to our factory system; and again, that the profits in making be ample, or sufficiently above those obtained from making the usual style of factory cheese, and at the same time to place Stilton before consumers at a price low enough to send it into general consumption.

This, it seems, has been accomplished by the somewhat recent modification of methods for producing Stilton in Leicestershire, England, and which I think may be turned to good account on this side of the Atlantic.

The plan of making modern Stilton, if I may so name it, is that adopted by Mr. Thomas Nuttall of Leicestershire, for the description of which I am indebted to the excellent report of Mr. George Gibbons, one of the judges on cheese-making at the late exhibition of the

Royal Agricultural Society. As to the quality of Mr. Nuttall's Stiltons, the numerous prizes, gold cups and medals, received at many fairs and dairy shows, attest their excellence. In 1879, Mr. Nuttall was awarded first premium for Stilton at the International Dairy Fair in New York, and also the first and second champion prizes at the dairy show held in Birmingham in 1881.

The new process discards the idea that Stilton cheese can only be made by the addition of extra cream, or that cream must be taken from the evening's milk and mixed with the new milk of the morning, thus necessitating the making of a large quantity of skim cheese, unless the skimmed milk can be otherwise disposed of. No extra cream is used in its manufacture. The cheese is made from new milk fresh from the cows twice a day, morning and evening, by the most simple and natural process possible.

Without going into all the details of manufacture, as practiced in Leicestershire, I shall only allude to some of the leading points in the process as adapted to our factory system.

The cheese vat is similar to our factory vats—that is an outer vat of wood lined with tin, and space between the two for water, and holding about 600 gallons. The milk is set (with rennet) at a temperature of 79° Fah., and a sufficient quantity of rennet is added to perfect coagulation in from 1½ to 1¾ hours. The rennet should be thoroughly mixed through the milk. The coagulation having been perfected, four persons take their places—two on each side of the vat—and with small tin bowls, commence removing the mass of curd into cloths, which are placed in tin vessels called drainers. These drainers are six feet long, two feet wide, and six inches deep.

Iron rods are fastened across the drainers at intervals of 18 inches, on which the sides of the cloth are placed. The drainers are also provided with faucets for drawing off the whey. Two of these drainers are fixed on a frame, two feet apart, one above the other, standing on wheels for easy removal. As soon as these are filled, they are placed on one side of the dairy room, and others take their place. Thus, in the space of about twenty-five minutes, all the curd is taken from the vat, which is at once carefully cleaned. The cloths containing the curd are loosely tied by the four corners, thus allowing the whey to partially separate from it. But it is considered essential that it does not drain off, the old saying on this point of manufacture being 'that it should wallow in its own whey.'

In about an hour the faucets are turned and the whey is allowed to drain off, when the cloths, after being tightened, are placed close together in a larger drainer, similar in dimensions to the cheese vat. Here they remain 12 hours, when the whey, which by this time has considerably further separated, is allowed to escape; the cloths are again tightened, and the curd having now obtained a considerable amount of consistency is placed in other coolers.

The curd is in a little time removed from the cloths and cut into pieces. After remaining in this state 12 to 24 hours, it is coarsely ground and the morning's and evening's curds are well mixed, with 6½ ounces of finest cheese salt to every 24 pounds of curd.

It is then put into tin hoops perforated at the sides, and 12 inches deep by 18 inches in diameter. These when filled are placed in a room with a brick floor fitted with shelving, and heated to a temperature of 65° Fah. This causes the whey to exude rapidly, gradually ceasing at the expiration of five or six days. The cheeses are then removed from the hoop and taken into the binding-room where they are smoothed with a knife and bandaged by strong cotton cloth being pinned around them. This smoothing is repeated daily, and dry bandages applied, until the cheeses get firm and partially coated, which generally takes place in about 12 days.

They are then removed to the drying rooms, which are also kept at a temperature of 65° Fah. by means of steam pipes, or cooled by water trickling over the slates from a perforated pipe. The cheese is considered fit for sale at about six months old, when the 24 pounds of

curd placed in the hoop will have produced a cheese of some 12 pounds weight. Thus it will be seen the cheese in this process may be said to almost make itself. There is no waste of butter in the breaking, there is no pressure applied, and it is scarcely touched with the hands. A fine, rich, creamy product is the result, which, with its deep blue veins, commands the highest price of any cheese made in Britain.

It may be remarked in this connection that the lovers of Stilton require the cheese to be streaked with veins of blue mould; hence the necessity of giving it some age before placing it on the market. To a large number of consumers the blue veins are not considered essential, and for such the cheese would be sooner ready for consumption, and from its mild, delicate flavor, and rich, stocky texture always commands a ready sale, at *extreme rates*.

The plan of making, here described, is adapted to American factories, and I believe could be entered upon in a limited way with success, the product being employed both for home use and for export."

**Cheshire Cheese.**—In making this cheese the evening's milk is set during the night and skimmed in the morning. The skimmed cream, with a portion of the milk, is then heated up to 130° F., a sufficient quantity being thus heated to raise the whole of the evening's and morning's milk together to about 90°. About twelve square inches of rennet is placed in a pint of salt water and soaked about twenty-four hours previous to making the cheese, this quantity being sufficient for a hundred gallons of milk. The curd is set from forty to fifty minutes; it is then cut very slowly, the whey being syphoned or pumped out as soon as possible. Before the whey is all removed, however, a portion of it is heated and returned to the vat, where it is left for half an hour, the whey being afterwards drained off, and the curd left to get firm. The test of its firmness is when a cube of about a pound weight will stand on the hand and not break. It is then drained off by being placed upon a drainer made with a false bottom of rods, and left for forty-five minutes, after which it is broken up and salted, in the proportion of from three and a half to four and a half pounds per hundred weight of curd.

A light weight is then placed upon it for about three-quarters of an hour, during which time it is turned over once or twice, and cut into squares. It is then passed through the curd mill, and afterwards put into the vat, a cloth being first pressed into place by a tin hoop, and the curd placed carefully in it. After being in the hoop in this manner with a slight weight upon it for one or two hours, according to the weather, it is turned over and put into a kind of oven or warm chamber in or near the brickwork of the dairy chimney, where it remains during the night at a temperature of 90° to 100°. In the morning it is turned upside down in a fresh cloth and pressed three days, being turned twice a day, and the cloth around it changed at each turning. Cheese made in this way requires from five to seven days for drying, but afterwards matures more quickly than that made by some other methods.

**Cheddar Cheese.**—The Cheddar cheese is regarded by the native Englishmen as the best cheese in the world. American dairymen have not yet been able to surpass in excellence the fine specimens of the English product. The chief characteristics of this cheese may be regarded as mildness and purity of flavor; mellowness and richness; long keeping qualities, and solidity. An English manufacturer of Cheddar cheese describes the process as follows:

The morning's and evening's milk are together brought to a temperature of 80 degrees Fahr. If the night has been warm, a temperature of 78 degrees will give as great effectiveness to a given quantity of rennet as one of 82 or 84 degrees would give if the milk had been at a lower temperature for some hours on a cold night. The evening's milk having been placed in shallow vessels during the night to cool, and having been stirred at intervals during the evening, is skimmed in the morning, and the cream, with a portion of the milk, is heated up to a hundred degrees by floating it in tin vessels on the boiler. The whole of it

is then poured through a proper sieve into the tub—into which the morning's milk is being also stirred as it arrives—so as to raise the whole, as I have said, to from 78 to 82 degrees Fahr. This tub may be a large tin vessel, capable of holding 150 gallons, and provided with false bottom and sides, enabling hot or cold water to be passed under and around its contents.

The rennet, made from two or three dozen vells, in as many quarts of salt water, and allowed to stand three weeks, is added—half a pint to 100 gallons—and the curd sets in about half an hour. The small vells (rennets) of calves, which are killed at about a week old, are preferred, and they should be eighteen months old before use. The curd is slowly cut with a single long blade to and fro throughout its depth, in lines forming a 4-inch mesh upon the surface, and the whole mass is gently turned over from the bottom with a skimming dish in the hand.

The whole is then again worked throughout with a "shovel-breaker," a four-fingered paddle with wires across the fingers—great care being taken to do it gently, so that the whey shall not become too white. The curd is thus broken up into pieces not much larger than peas, and at least half an hour is taken in the process. Hot water is then let into the space around and below the cheese tub, and the whole is raised to 100 deg. Fahr.; and this, too, is done gradually, so as to raise the whole by degrees, not heating any portion to excess. This also takes half an hour. The hot water is then drawn off, and the curd is stirred by the hand and a skimming dish for another half hour in the midst of its hot whey, being at last reduced to a mass of separate bits the size of small peas. The whey, after settling for half an hour, is then removed—ladled, syphoned, or drawn—to its vat, where it stands about six inches deep, and is skimmed next day, yielding a butter which should not exceed in quantity six to eight ounces per cow per week.

The curd stands half an hour after the whey is drawn off, and it is then cut in four or five pieces, turned over and left for half an hour, after which it is again cut and left for a quarter of an hour. After this, it should be in the slightest degree acid to the taste. If allowed to become too acid, it will not press into a solid, well-shaped cheese, but will be apt to sink broad and be misshapen. It is now torn into pieces by hand and left to cool; and thereafter it is packed in successive thin layers in the vat—a cylindrical or wooden vessel twelve inches or more wide and twelve inches deep—whence, after being pressed for half an hour, it is taken out (it is then probably midday), and broken up by hand, and allowed again to cool. Then, when cool, hard, sour, dry, and tough enough (all this, of course, being left to the judgment of the maker), it is ground up in the curd mill; two pounds of salt are added to the cwt. of curd, and the whole is allowed to cool, and as soon as cold, it is put in the vat and taken to press. It is then probably 3 p. m. The pressure on the cheese may be 18 cwt. The cloth is changed next morning.

A calico coating is laced on it the second day, and the third day the cheese may be taken from the press, placed in the cheese room, bandaged, and turned daily, afterwards less frequently. The cheese room should be kept at nearly 65 degrees Fahr. The cheese will not be ready for sale for three months. The process of making Cheddar cheese lasts all day, and the cheeses are made of various sizes, generally twelve inches wide and a foot high, but sometimes larger in both dimensions, and from 70 to 100 pounds in weight; the object being to make all the milk of one day on a farm of thirty to forty cows into a single cheese.

**Single Gloucester Cheese.**—There is, no heating process in the making of this cheese, the rennet being added to the milk as soon as it is deposited in the tub or vat. As soon as the curd is set, it is broken up with a wire breaker, by moving it up and down, which has a tendency to make it into a kind of pulp. The mass is then left to settle and attain a proper degree of firmness, when the whey is dipped off; the curd is then cut across and put to press. It is taken out of press in the morning, turned, and salted on the outside. It is returned to the press, and taken out and treated in the same manner for five or six successive

days. After being taken from the press, it is put upon a shelf and turned every day, and after curing in the cheese room for two or three months, it is ready for market. The Double Gloucester cheese is made by the addition of cream to the milk.

**Gorgonzola Cheese.**—This is an Italian variety of cheese that is imported into England to a considerable extent, and is highly esteemed there by the wealthy consumers, being considered by many as equal to the Stilton variety. Willard says, respecting this kind of cheese:

“At the International Dairy Fair in New York a few years ago, samples of Italian Gorgonzola were shown, and they were examined with much attention by many of our dairymen at the exhibition, and the question was then frequently asked whether this variety could not be successfully imitated in this country. I have heard, however, of no attempts having been made in this direction, though I am told the cheese is imported and may be found occasionally in New York and other of our chief cities in small quantity, and that it sells for a very high price—from twenty-five to thirty cents per pound, and sometimes more. The cheese has obtained prizes at London, Paris, and Florence, and its excellence has been in part attributed to the healthy and aromatic plants upon which the cows feed. Good sweet grasses, grown upon soils and in locations where they can mature in perfection, have undoubtedly an important influence in promoting the flavor and richness of cheese, in distinction from grasses grown on low, wet grounds, or where there is a surplus of moisture to cause it to be watery, immature, or furnishing feed that farmers usually designate as “sour.”

Some of the leading features in making Gorgonzola appear to be the mode of expelling the whey from the curds; the mingling together of the warm and cold curds; the manner of applying salt, and the curing of the cheese.

The curds are made twice a day from warm milk, soon after it is drawn from the cow, good sweet rennet being employed for coagulation, and a sufficient quantity used to perfect that operation in from ten to fifteen minutes. The curd is then broken up and left alone until it has settled to the bottom of the vat, when it is still more divided up with a wooden instrument, always drawn in one direction.

The whey having separated, the curd is hung up in hempen bags to drain. The cold curds of the evening are mingled with the warm curds of the next morning's mess of milk, being placed in flexible wooden bands covered on their inside with hemp cloth, and placed on an inclined board, strewn with rye chaff. In mingling the two curds together, care is taken that the upper and lower sides of the cheese are formed of warm curds, so as to insure a good rind—the cold and warm curds, if mingled for the outside, not properly uniting. With this exception, the two curds forming the cheese are mingled in layers, the warm and cold alternating. The curds, thus mingled, are further drained during the first day of the process by two or three turnings. On the following day, the cheese having obtained some consistency, the cloth is removed and the cheese weighed. After three or four days, fermentation begins, and the wooden bands are removed. It is then salted on its upper and lower sides once a day alternately for eight or ten days, four ounces of pulverized salt being used on an average for thirty-five pounds of cheese. Some manufacturers adopt the plan of frequently turning and pressing the cheese against a salt-covered surface, thus insuring more uniformity and a better rind.

The color changes in a month to a pinkish white, if good, and if bad, to a black. When black, the rind is soft, and the cheese perishable in summer. If the crust is sufficiently hard, the shade is improved by one or two dippings in salt water. The cheese is cured in a room kept at a temperature of about 65°. They are placed on tables thinly covered with straw, at first; afterwards they are kept in a cellar for six or eight weeks, and during that time they are repeatedly turned, wiped, and salted. It takes about 100 quarts of milk to make twenty-five pounds of cured cheese, or cheese fit for market.

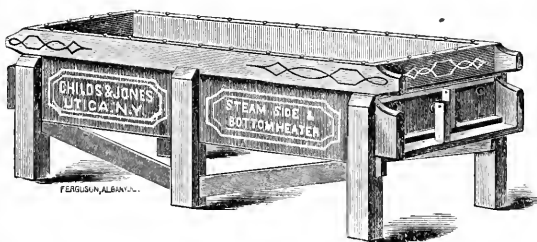
The cheeses vary in size from twenty to forty pounds and upward. When ripe, the blue mould has developed similar to the condition of Stilton when esteemed in its best state. Indeed, its consistency resembles a fine specimen of rich and ripe old Stilton. I have no doubt the Gorgonzola can be successfully imitated in America, as Swiss, Limburger, and other foreign varieties are now manufactured here of as fine quality as that which is made abroad."

**Schalzieger Cheese.**—This celebrated cheese of Switzerland is made from skimmed milk cheese, which, when it is several months old, is ground up fine and mixed with one-twentieth of its weight of the powdered leaves of the melilot trefoil (*Trifolium melilotus cerulea*), and one-tenth of its weight of fine salt, to which is added oil or butter, working the compound into a paste, which is pressed and dried, when it is ready for market. Garden sage is frequently used by the dairymen of this country in making a variety of green cheese, commonly known as sage cheese, for home consumption, but not to any extent for exportation.

**Buttermilk Cheese.**—This is an article little used except when eaten fresh, when it is a very palatable food. The quality of this cheese will depend principally upon the quantity of butter and casein which the buttermilk contains. Several different grades of this cheese are frequently obtained by mixing more or less of sweet milk with the buttermilk before it is heated, the acid of the buttermilk causing the coagulation of the sweet milk, which causes it to mix with the former, thus improving the quality of the cheese in proportion to the amount of sweet milk added. This kind of cheese is sometimes found in some city markets, put up in small packages of tin foil, and is of a soft, creamy nature.

**Proper Temperature of Curd.**—The exact temperature to which the milk should be heated for cheese before the rennet is added, depends upon the kind of cheese that is to be

made, a lower temperature being desirable, such as 72° to 75° for instance, when a thin cheese is made, while for thick cheese, such as Cheddar, it should vary from 80° to 84°; 80° being generally considered best adapted to warm weather, and a little increase being desirable in cold weather. Great care should be taken in

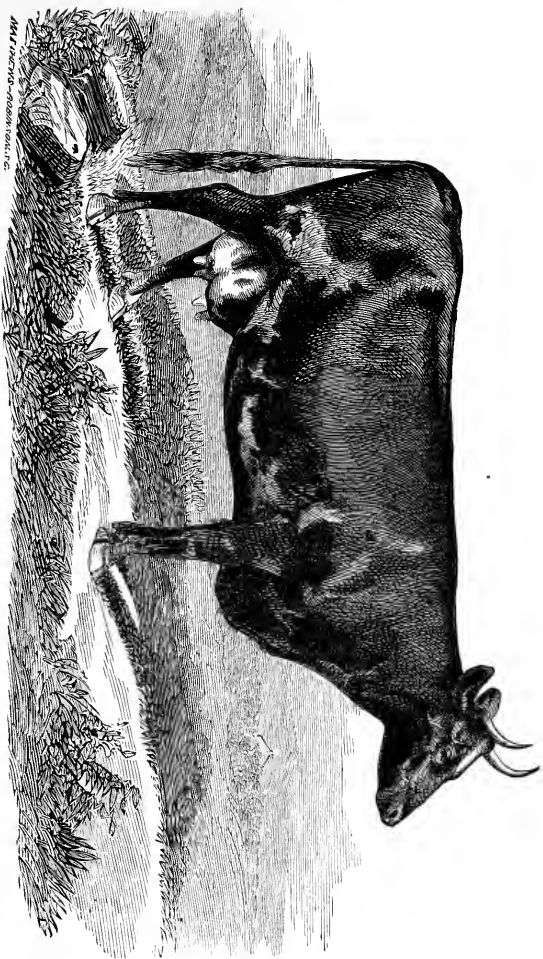


STEAM CHEESE VAT.

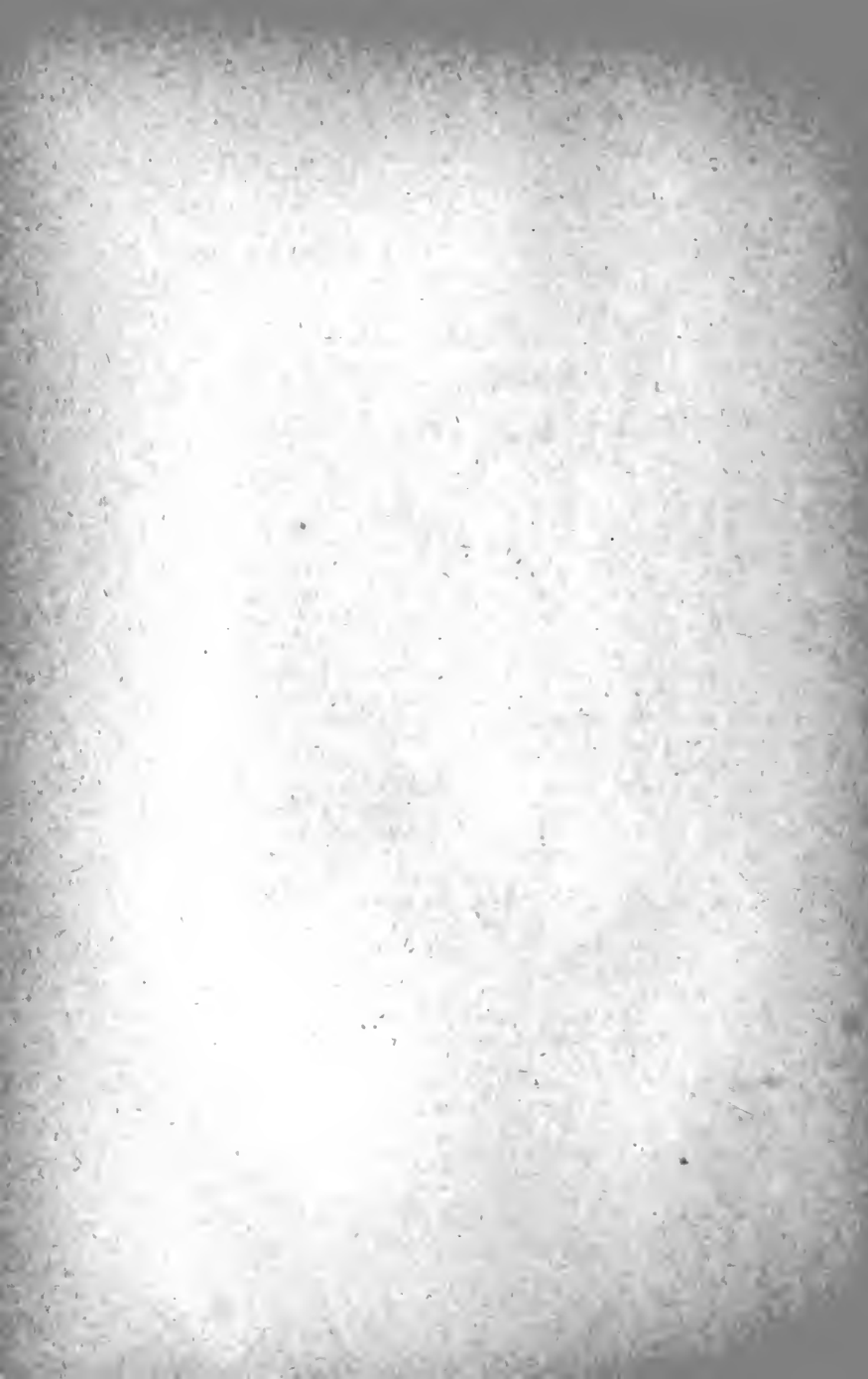
warming the milk, not to overheat, or to allow it to burn at the bottom, as it would be liable to do where steam is not employed for heating. The slightest carelessness in this respect would greatly injure the flavor of the cheese.

After a portion of the whey has been separated from the curd, most dairymen scald it sufficient to raise the temperature of the entire contents of the cheese vat to about 95°, but never above 100°. Much injury is frequently done the cheese by overheating in the making.

Mr. Alexander McAdam of the Smith Creek factory says: "In making cheese early in the spring, we make from milk, three messes of which are skimmed and one new; when skimmed, the milk is put in a place where the temperature is adapted for cream raising. Set at eighty, and coagulated sufficiently to cut in thirty minutes, it begins to thicken in fifteen minutes. We use extra rennet for skim milk cheese, and heat slowly to 88°. Sometimes in cold weather the milk is very sweet, and it may lie five or six hours in the whey. We mean to keep the temperature at about 88°.



AYRSHIRE COW, "FLORA."  
Owned by William Birnie, Springfield, Mass.



When the weather becomes warmer we use the milk with one mess skimmed, and then the temperature would be at 82° and heat up to 92°, keeping to this temperature. The milk would require thirty-five minutes to coagulate. We are accustomed to have coagulation occur sooner than some factories, as some let it run an hour, or even an hour and ten minutes. By scalding as low as 88°, the curd keeps soft and the acid is developed before the curd becomes solid. We use more rennet, less salt, and less heat when making skim-milk cheese, than without skimming the milk. The salt is applied upon the slightest appearance of the acid. We use it at the rate of one and one-half pounds of salt to the thousand pounds of milk. The appearance of the cheese after coming from the press must be the guide to the temperature, and according to the appearance of the cheese is determined the place upon the shelves. The curd should be put to press as soon as convenient after grinding, and before it gets too cool to face well.

If it failed to face, we used hot water and hot cloths under the follower and hot water upon the press board. If too much rennet was used, the curd would be rather slimy, and it would not unite as well, but if the rennet was sweet, the taste would not be affected. If too much rennet was used, some of the excess would be held at least mechanically in the curd, and would appear in the color.

We use with all new milk in spring manufacture a temperature of 88°, heating to 94°, and in curing we would not use over 65° in the dry-house—such a handling would produce a fine-flavored cheese. The action of heat facilitates the action of the rennet. We would use more heat after applying the rennet. As a general thing we do not think 2° or 3° in temperature would make a great difference in the price of the cheese when made. We think time would modify the slight excess of temperature. We would heat whole milk up to 96° in the summer time."

**Use of Thermometers in Cheese-Making.**—Thermometers should always be used in testing the temperature of milk when set, that is, when the rennet is put in. It is too often the case that they are entirely ignored in the dairy. Dr. Voelcker says with reference to this subject:

"It is really amusing to see the animosity with which some people look upon the thermometer. It is true that there are not many dairies in which it may not be found; but if we took pains to ascertain in how many of these it is in constant use, I believe that the proportion would not exceed five per cent. This is a great pity, for a tolerably good one can now be bought or replaced at a trifling cost.

Some years ago I gave a lecture on cheese-making to a number of farmers' wives and dairywomen on the estates of the late Lord Fitzhardinge. At the close of my remarks I invited discussion, and after a little while a lady got up and said, 'Well, doctor, what you have to tell us is all very well, but can you make cheese?' 'Yes, I think I can,' I answered; 'but at any rate I will try, if I have a fair chance, and see the thing done from beginning to end. The produce of a great many cheese dairies is spoilt by the cows being milked with dirty hands and so forth.' 'Very well,' said she, 'if you will come I will send for you.' I was then residing in the neighborhood. A date was agreed upon, and at half-past five, on a cold morning, she sent her trap and I drove five miles to see the cows milked. When the rennet was about to be put in I asked her whether the temperature was right. So she dipped in her hands and said, 'Yes, I think that will do.' On inserting the thermometer, however, I found it was just 10° lower than it ought to be.

At this her husband, a smock-frocked farmer who was standing by, said, 'Ah! Sally, I tell you, you have spoiled many a cheese for me by feeling the milk with your hands instead of testing it with the instrument.' Well, at last a large cheese was made and marked, and when sold it brought more money than she had been in the habit of getting. After this nearly all the farmers in the neighborhood presented their wives with a thermometer apiece.

With frankness I express my regret that the use of the thermometer is not more general, as I believe it is indispensable for obtaining a uniformly good product.

If the temperature of the milk when the rennet is added, is too low, the curd remains too soft, and much difficulty is experienced in separating the whey. If, on the other hand, the temperature is too high, the separation is easily effected, but the curd becomes hard and dry. The amount of water which is left in the curd when it is ready to go to the cheese-press, to some extent indicates whether a proper temperature has been employed. When this has been too low, the curd will contain more than fifty-five per cent. of moisture; when too high, sometimes less than thirty six per cent."

**Preparation of Rennet.**—Rennet is a preparation of the stomach of young grass-eating animals, it being made use of for cheese-making while the animal is young, and before it has taken any nourishment except the milk of the dam. The stomachs of young pigs are occasionally used for this purpose, but those of calves from three to six weeks old are considered the best. Rennets should only be taken from healthy calves, and such as have been well fed from the time of birth to that of slaughtering. There is a great difference in the strength of rennets; those from calves that are delicate eaters will be weak, while strong, vigorous calves will furnish rennets that are strong and effective. They should never be taken from a calf until the excrement shows the animal to be in a perfectly healthy condition. Good rennets may easily be spoiled by being improperly saved or prepared.

It is often the case that where rennets are salted down, a single tainted one in the brine will spoil the entire lot. When a pure article can be obtained, the liquid chemical preparation is most convenient for use, but it frequently happens that dairymen prefer to prepare their own rennets. The best time for killing the calf is from twelve to eighteen hours after taking a moderate meal, at which time the stomach will be nearly empty. On slaughtering the animal, the contents of the stomach should be carefully removed. The best part of the rennet is contained in a soft, delicate coating of a pulpy character, which covers the interior of the stomach. This may be very easily rubbed or washed off; it should therefore be handled with care, all rubbing or washing to be avoided.

If after trimming and turning it inside out there be anything that should be removed, it should be wiped off very carefully, avoiding, if possible, anything that shall deteriorate the strength or quality. After being moderately salted, it is sometimes blown up like a bladder: but the usual method is to stretch them out on a forked stick in a dry atmosphere, the temperature not exceeding 100° F. If heated above this temperature the strength of the rennet is weakened. It has been found that when heated to 169° the strength is entirely destroyed, especially when damp. Rennets should never be permitted to gather dampness, as the strength will by this means deteriorate. Rennets will be all the better after drying, if left exposed to the air for a year before using, as by this treatment the strong animal odor peculiar to the fresh rennet will be nearly removed, and they will also yield more strength than when new, or not dried. It is not a good practice to preserve them in brine, as is sometimes done, as by this means all the objectionable odors of the green stomach are retained and affect the cheese, while they possess less strength than when dried. When rennets are properly prepared and dried, they will have no unpleasant odor, and will be of a clear, white color. Never use those that are dark in color, or are not sweet in smell.

To prepare rennets for use, they should be soaked in weak brine, in the proportion of one rennet to three or four quarts of water. Whey for soaking them was formerly used quite extensively, and at present to a certain extent, but there are serious objections to this method, the best cheese manufacturers of the present time preferring weak brine. The editor of *The National Live Stock Journal* gives the following valuable directions for preparing rennet:

"Having selected the rennets to be used, their strength will be most readily and completely obtained by soaking them in a weak brine. A strong brine is generally employed.

but it is objectionable for the reason that it contracts the tissues in the membranes of the stomach, and thus prevents the ready escape of its strength. A brine containing about five per cent. of salt—or, say, a pint of salt to a pailful of water—will soak out the strength quicker and more completely than either a strong brine or pure water. Brine, however strong, does no injury to the active agency in rennet. It may be salted to saturation, and in excess of saturation, without impairing its power in the least. The only objection to making the brine too strong is, that it hinders the separation of the rennet's strength; therefore, soak in a weak brine first—a pint of salt to about twelve quarts of water—and, after the strength is out, throw away the rennet skins, and put into the liquid all the salt it will dissolve, and a little in excess, in order to secure its keeping.

When soaking in weak brine in warm weather, the rennets will soon taint and spoil if kept soaking too long. To prevent this, soak in a small amount of weak brine *one day*, if very warm, or two days, if not very warm, and rub or pound them often. Then turn the liquid into a separate vessel, and salt it to saturation for keeping. This will free the rennets from what would have the strongest tendency to cause tainting. If the rennets are now covered with a new, weak brine, they can be soaked and rubbed *twice* as long as before without danger of tainting; and by this time their strength will be pretty well exhausted, and they may be well drained and thrown away, or dried for steeping again in cold weather, if desired. Let the second steeping now be turned in with the first, and salted with a little more salt than it will dissolve, and it will be ready for use or for keeping.

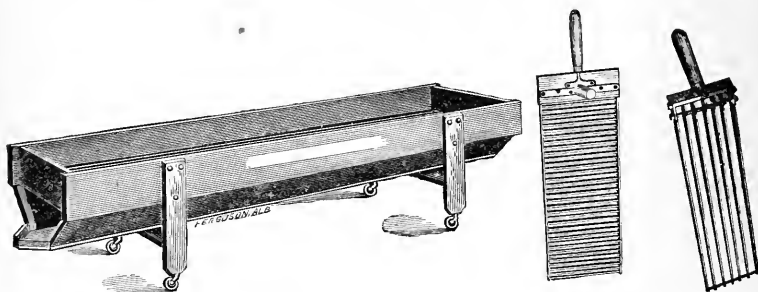
The best time for preparing rennet is in cold weather, when the soaking in weak brine can be carried on as long as desired without danger of spoiling. Only one soaking will then be required. Cold does no injury to them, but, on the contrary, freezing helps very much in liberating their strength. The oftener they are frozen and thawed, the more strength can be got out of them. After the steeping is done, set the liquid in a cool place, and salt to saturation, and stir occasionally, and it will keep almost indefinitely. Rennets enough for a whole season's use may thus be prepared in advance, and save much trouble and waste in preparing them in hot weather. The use of tainted rennets should be carefully guarded against. The practice quite common, of soaking rennets in whey, either sweet or sour, should be avoided, as the whey invariably tends to the injury of the cheese. Water is the best known agent for preparing rennets, and to it nothing but salt should ever be added.

Rennets are much more liable to become tainted than salt meats, and should therefore be carefully selected and prepared, as the quality of the rennet affects that of the cheese made from it very materially. The liquid should never be used without first being strained, as small pieces will be liable to be rubbed from the skins and become mixed with the curd. Wooden casks and tubs are objectionable receptacles for soaking rennets, since the wood soon absorbs and holds enough of the liquid to taint the rennets, and no washing or scalding will wholly remove it. Glazed stone ware is the best for this purpose, but care should be used in selecting that the glazing be unbroken, for unless the glazing is perfect on the inside, the slightest break or crack will cause it to absorb the liquid, and soon taint the contents of the jar.

**Quantity and Quality of Cheese.**—The cheese factories of New York average from the common, ordinary dairy stock, during the entire grazing season, about ten pounds of cheese to one hundred pounds of milk, the cows being fed on grass in the usual way. Although the milk of some cows will produce considerably more than this quantity, and others less, the above mentioned quantity has been found to be about the average standard for cheese in the factories where there is such a large quantity of milk and a mixture of different qualities from various sources. Cheese that is less firm in texture than that designed for exportation, will contain considerable moisture, and will probably average more than the abovementioned average.

The imperfect separation of the whey from the curd is frequently the cause of deteriorating the quality of the cheese. If the process of the separation of the curd from the whey is hurried too much by the curd being broken too soon, the whey will not drain off properly, and when this separation is imperfect, no amount of pressure afterwards applied will remedy the evil. If the curd stands too long before being broken it will be tough and firm, while if broken too soon, besides retaining the whey as above mentioned, much of the fatty matter will be pressed out and lost, consequently the cheese will contain less of the butter element than if the process of separation had been more slow and gradual. Such cheese will be liable to bulge out at the sides, blister, crack, and have a strong flavor; while in being cut it will be found to lack compactness and uniformity of texture, being full of cavities.

The curd should stand sufficiently long to be coagulated, or so that it may be cut into cubes in the vat with a knife. The quality of the milk, the degree of heat employed in its preparation for setting, the quality and quantity of rennet used, manner of curing, etc., all have a great influence in determining the quality of the product.



CURD SINK.

STEEL CURD KNIVES.

**Floating Curds.**—The cause of this difficulty, which cheese makers sometimes have to meet, is generally conceded to be tainted milk, or milk in a fermented state. The cause of milk being in this condition may be a diseased or feverish state of the cow before the milk was drawn from the udder, or from improper treatment of the milk, lack of cleanliness, etc., after being drawn. It has been found that floating curd contains spores of a species of fungus, which generates a gas when the curd is at a temperature of from 80° to 90°. This gas causes each cube of curd to become so expanded as to become lighter than the same bulk of whey; hence it rises to the surface and floats. To prevent floating curds, avoid the cause.

The cows should have a proper amount of suitable food, and access at all times to a sufficient supply of pure, running water. Never permit them to drink from stagnant pools, or water made filthy from any cause. Every cow whose milk is used for any purpose whatever should be in a perfectly healthy condition. The utmost cleanliness should be regarded in the milking, and handling the milk afterwards, that no taint or animal odors may be found in the milk. The utensils employed in the making of the cheese should all be thoroughly washed in warm water, with soap, and afterwards scalded by steam or boiling water.

Milk easily absorbs taints and odors from the atmosphere and other sources, and too much precaution can scarcely be taken to have everything as clean as possible pertaining to it. Sometimes poisonous weeds eaten by a single animal, or one diseased cow in a large herd will spoil the milk of the whole dairy. By strict attention to sanitary conditions and cleanliness in every particular, the evil may be avoided.

**Addition of Cream or Butter to the Curd.**—The quality of cheese may be greatly improved by the addition of cream to the curd, since the greater the proportion of cream or butter in the cheese, other conditions being equal, the richer the quality. The cream should, however, be well mixed with the milk at the time of setting, that the cheese may be uniform in quality.

**Cutting the Curd.**—When the curd is sufficiently coagulated or hardened in the vat for the separation of the whey, this separation is facilitated by cutting the entire mass into cubes. This is done by running the perpendicular and horizontal curd knives through it, — the former across at right angles, — thus effectually breaking it up.

The old-fashioned implement for cutting the curd was a single blade, wooden knife, made in the most clumsy manner. With this the curd was cut into large blocks, and subsequently broken up by the hands, which resulted in considerable labor and a loss of cheese. An improvement on the wooden knife was the breaking of the curd with wire held in a triangular frame. By having the breaker correspond with the cheese tub, and one-half its diameter, no portion of the curd would be broken twice. The next implement for this purpose was the tin breaker, which was followed by the perpendicular and horizontal steel knives now in use in all well regulated dairies. The object is to cut the curd into pieces of desirable uniform size without bruising or crumbling it, as any undue agitation of the mass by rough handling results in a loss of some of the best elements of the cheese.

**Coloring Cheese.**—It is a fact well known to all butter makers that when cream becomes too warm in the churn, the butter is invariably light colored. The same principle holds true in cheese making, and, as it is necessary to heat the curd to make cheese, this heating process has a tendency to take out the color. Knowing this fact, it would seem that the cheese consumers would prefer cheese of the natural color rather than an artificial coloring, since annatto—the only substance used for this purpose—adds nothing to the flavor or nutrition of the cheese.

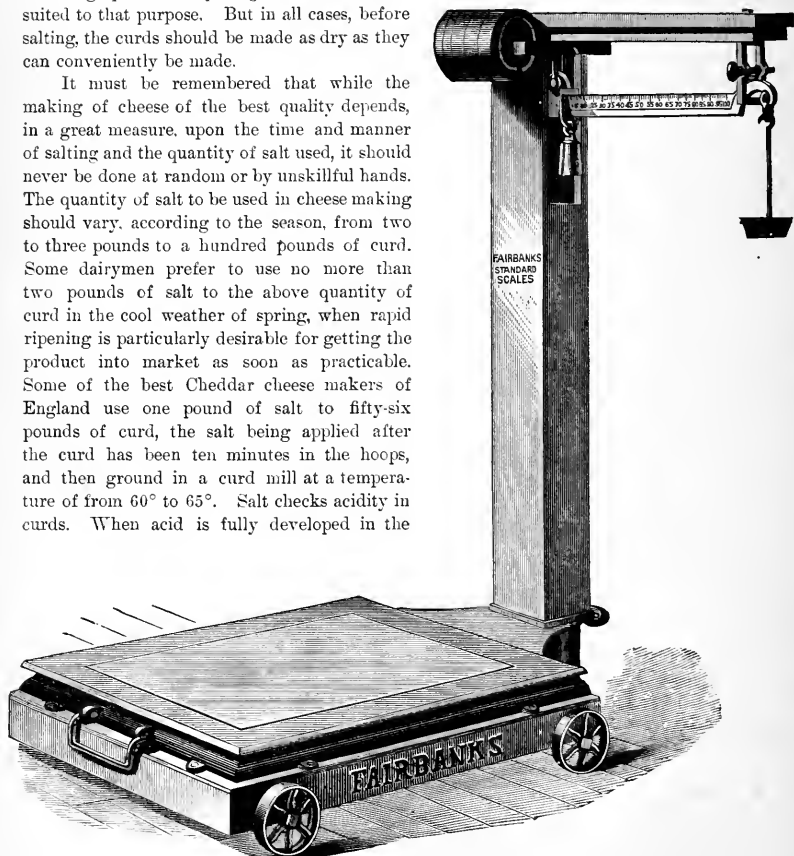
Pure annatto is prepared from the seeds of the shrub *Bixa orellana*, which grows in South America and the West Indies. It is soluble in alcohol, ether, potash, and soda, and is regarded as being in no way injurious. But it is frequently adulterated with red lead and other poisonous compounds; and when used, care should be taken to obtain, if possible, the pure, unadulterated article. As long as there is a demand for highly-colored cheese in the market, and the consumers are willing to pay a higher price for such, the dairymen will of course furnish the article; but we think it would be better if the practice of artificial coloring were abolished altogether. We would at least advise a toning down of color by the use of considerably less annatto than is indicated by many of the highly-colored cheeses at present seen in the market.

**Salting Curd.**—The principal object of salting curd is to preserve it in a pure and wholesome condition, although it is an important agent in also fixing the flavor of cheese. Some dairymen prefer to add the salt when the curd is warm, others when it is cold. We are of the opinion that the finest-flavored cheese can be obtained by salting the curd when it is at a low temperature. This is the common practice, strictly adhered to, in all the celebrated dairies of England. We learn from the highest authority that in the manufacture of both the Cheddar and Cheshire varieties of cheese, the maximum temperature of the curds in applying the salt is 75°, yet the best quality is made when the curd is at a temperature of 60° or 65°. When curd is salted at too high a temperature, it is apt to affect the flavor of cheese injuriously, and also to harden the curd and prevent the free extraction of the whey. The whey should be removed as far as possible before the curd is salted, as there should be no guess work about the quantity to be used.

Salt is an important agent in ripening cheese, it being found that when little salt is used

the cheese ripens rapidly and must be eaten when it is comparatively green, or it soon gets out of flavor. On the contrary, too much salt retards the ripening process, and the cheese, being long in coming to maturity, will be hard and stiff. The quantity of salt must be determined, in a measure, by the character of the cheese. With a certain quantity of salt added to the curd — other things being equal — the cheese will be ripe and ready for market in thirty days, and so on, regulating the amount of salt used by the nearness or remoteness of time between the making of the cheese and the marketing; cheese of long-keeping, slow-maturing qualities requiring an amount of salt suited to that purpose. But in all cases, before salting, the curds should be made as dry as they can conveniently be made.

It must be remembered that while the making of cheese of the best quality depends, in a great measure, upon the time and manner of salting and the quantity of salt used, it should never be done at random or by unskillful hands. The quantity of salt to be used in cheese making should vary, according to the season, from two to three pounds to a hundred pounds of curd. Some dairymen prefer to use no more than two pounds of salt to the above quantity of curd in the cool weather of spring, when rapid ripening is particularly desirable for getting the product into market as soon as practicable. Some of the best Cheddar cheese makers of England use one pound of salt to fifty-six pounds of curd, the salt being applied after the curd has been ten minutes in the hoops, and then ground in a curd mill at a temperature of from 60° to 65°. Salt checks acidity in curds. When acid is fully developed in the



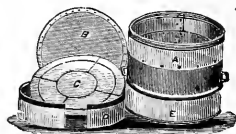
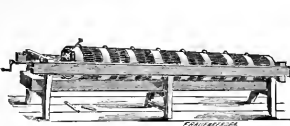
PLATFORM SCALES.

curd, salt applied at the proper time will check the further progress of it, and thus is made to serve a very important purpose in cheese making. Salt of the best quality should, however, always be used for cheese. Some salt has a bitter flavor, which greatly injures the butter or cheese in which it is used. Saltpetre is used in small quantities in some English

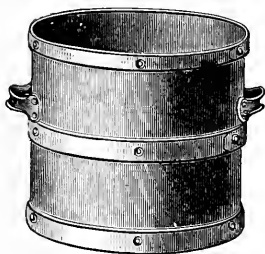
dairies, in the proportion of three or four pounds to a barrel of salt, and is thought to aid in preserving the flavor of cheese, as well as to improve its keeping qualities.

**How to Distinguish Good Salt.**—Many persons suppose that because salt is of a preserving nature, that all salt to be found in the market is pure, provided it looks clean; but this is far from the fact. Salt may seem to all appearance to be free from all foreign matter, and yet be so impure as to greatly deteriorate the quality of the dairy products in which it is used. Chlorides of calcium and magnesium are the substances in salt that most injuriously affect the taste and quality of butter and cheese.

The best method of determining the purity of salt is of course by analysis; but as dairymen will not always find it convenient to be obliged to resort to this means, they should be acquainted with other ways of determining its quality. One of the satisfactory evidences of the purity of salt is its dryness. All the chlorides cause salt to absorb and retain moisture; consequently the more of these chlorides it contains, the greater the tendency to moisten. Prof. Porter gives the following description of pure salt: "A chalky, very fine-grained, or pulverulent salt is not the best for dairy purposes, and would at once be rejected, I believe, by experienced dairymen. A good dairy salt ought, besides being of proper chemical composition, to be of moderately fine grain, crystalline, and transparent, and, when seen in a mass, of a pure white color; it ought to be free from odor, and possess that sharp, pungent taste characteristic of pure salt."



GANG CHEESE PRESS.



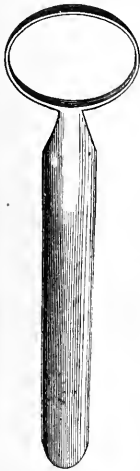
GALVANIZED IRON CHEESE HOOPS.

and possess that sharp, pungent taste characteristic of pure salt."

**Pressing.**—This process expels most of the whey that remains in the curd, thus consolidating it into proper form. Different sizes and kinds of hoops are employed, according to the size of the cheese to be made. Cloths are used between the curd and hoops, and should be adjusted in such a manner as to give the outside of the cheese a smooth appearance. The cheese should be occasionally turned during the operation of pressing, which generally takes from eighteen to twenty-four hours, and the press cloth renewed, after which it is taken to the curing room, and turned each day and rubbed with hot butter made from the skimmings of whey, to prevent cracking. The pressure should be at first gradual, since, if too great, the white liquid which flows will drain away what will contain some of the best elements of the cheese. Various kinds of presses are used. The gang press is now employed quite extensively in large dairies and cheese factories.

**Curing or Ripening.**—The ripening of cheese is the result of a slow process of fermentation or decay, which involves the decomposition of the casein and other matters, and which develops the peculiar flavor and odor of this product of the dairy, so different from

that of the curd. The rapidity and character of the ripening process depends much upon the quality of the milk, the method of curdling, the amount of whey remaining in the curd, quantity of salt used, and the treatment the milk and curd have received generally.



CHEESE TRIER.

As a general rule, the less whey the curd contains, and consequently the more hard and compact the curd is, the more the air is excluded, the less rennet and the more salt used in proportion to the curd, the more slow will be the curing process; while the more moist the curd is, or where the conditions opposite to those above mentioned exist, the sooner will the ripening process commence and be completed. Cheese curing rooms should be of a uniform temperature, not exceeding 75°, nor below 60° F. The best cheese may be spoiled by having the temperature of the cheese room either too high or too low, or, if the temperature varies largely at different times. Cheese should be turned often, and also be well rubbed with hot whey butter while curing, especially in the early stages. A cheese is considered cured or ripe when the flavor peculiar to cheese has become well developed.

**Cheese-making on a Small Scale.**—Where but two or three cows are kept, it is better for the farmer to buy his cheese than to attempt to make it on the farm. Where a farmer lives remote from a cheese factory or market, it would be a good plan for several small farmers to unite in cheese-making, delivering their milk daily at some central neighbor's house where the cheese is to be made, the labor involved being no more to handle ten or fifteen pails of milk, than four, while the cheese would be of much

better quality than if the curd were kept from different milkings until a sufficient quantity were obtained to make a cheese of suitable size.

If this method is not followed, and the farmer perhaps prefers to make a few cheeses from his own cows exclusively, it may be done very easily from the milk of from four to six good cows. We have eaten excellent cheese made from so small a dairy, when under proper management. Twenty-five gallons of milk will, on the average, make a cheese of about twenty pounds weight. A hoop eleven inches in diameter, and about the same height, will answer for a cheese of this size. The other requisites are a cheese-tub to "set" the milk in, a basket, and strainer cloth for draining the curd, and a press of suitable size to accommodate the size of the cheese to be made.

A kettle or boiler is sometimes used for setting the milk, but a wooden tub is better than metal, since it is a poor conductor of heat, and the milk will consequently retain the heat longer. But a metal-lined tub of wood is better still, because the metal will prevent the milk and whey from soaking into the pores of the wood, and the non-conducting wood will hold the heat. The milk may be heated by a common cooking stove, care being used not to burn it. We would recommend the use of a thermometer in testing the degree of heat, which should be from 80° to 84°. The rennet should previously be prepared, according to directions already given, and be ready for use. A good rennet, properly prepared, will curdle about 2,000 quarts of milk, but there is much variation in strength. The quantity to be used must be determined by experimenting and testing its strength, and should be sufficient to cause curdling to commence in fifteen or twenty minutes at the above mentioned temperature. When firm enough to separate readily, cut it into columns about an inch square, with a knife that will reach to the bottom of the tub, and leave it twenty or twenty-five minutes for the whey to separate, first covering it well to prevent the escape of the heat.

After standing the above length of time, the whey should be separated from the curd in sufficient quantities to cause the latter to settle considerably. The whey should then be carefully dipped from the top, after which the columns of curd may be carefully broken with the

hand, being cautious not to bruise or crumble it into fine pieces. Curd knives for horizontal and perpendicular cutting of the curd are the best implements for this purpose, and much to be preferred to hand breaking. After this is done, heat the whey that has been dipped off, or an equal amount of water, to 150°, and turn this over the curd so that all parts may be scalded alike. Stir it carefully, so as not to wash out the richness of the curd. Cover the curd again to prevent its cooling, and let it stand as long as it can without sticking together, which will be about twenty minutes. Then the whey may be dipped off again, and the curd drained on a strainer cloth over a basket, which will allow the whey to run off freely.

In about half an hour, by occasional turning and cutting, it will be sufficiently cool to be returned to the tub, chopped rather fine, so that the salt will distribute evenly, and salted at the rate of about one ounce of salt to twelve quarts of milk used; the rule with some being a teacup full of salt to a cheese weighing ten or twelve pounds. The salt should be evenly mixed with the curd when cool, which is then dipped into the hoop having a cloth spread in it. It should then be put to press, the pressure at first to be quite moderate for a few hours. As soon as the curd unites together so that it can be handled, remove it from the press, put in a dry press cloth, turn the cheese, and fold the cloth evenly, to make the surface of the cheese as smooth as possible, and press again, until the press is wanted for another cheese, the usual time for pressing being from eighteen to twenty-four hours.

After taking it from the press, let it stand about two hours until the outside becomes a little dried; then rub it well with hot whey, butter, or other soft grease, turning and rubbing it thus daily until cured, which will require from thirty to sixty days, according to the amount of moisture it contains, and other conditions. Great care should be used not to press the cheese too heavily, or a milky white liquid will flow, which will drain away the best part of the cheese.

**Sage Cheese.**—The old-fashioned sage cheese, that was formerly considered such a luxury, is sometimes seen in the market at present, and may be very easily made. For a small cheese of about ten pounds weight, two handfuls of green sage and one handful of parsley leaves are bruised and washed in new milk over night. When the milk is set next morning, about one-third is set by itself with this colored milk added to it; the other two-thirds of the milk is set, both being treated alike, as has been just previously described in making cheese on a small scale. When the curd is ready to go into the hoop, put in a layer of the white curd; then a layer of the sage-colored curd; and so on, in alternate layers. In pressing, the color is more or less distributed through the cheese, giving it a marbled appearance. Various flavors and colors are worked in by this method, wintergreen leaves, etc., being sometimes used for this purpose.

**The Cheese Fly.**—This is a great nuisance in the cheese-room. Mr. Willard says:

"Most dairymen understand pretty well the habits of the cheese-fly; many, however, do not understand how to provide against its depredations. Some people profess to be fond of a skippy cheese, and regard it as an index of what the English understand as a 'cheese full of meat'—that is, rich in butter. And it must be confessed that the cheese-fly has a great partiality for the best goods in the curing house. They do not so readily attack your 'white oak' and skim milk varieties; hence the notion that cheese infested with the fly is rich in butter is not far out of the way.

The primary cause of skippy cheese, of course, is want of care. Cheese in hot weather should be closely examined every day; they require to be turned once a day to facilitate the curing process; the bandages and sides are to be rubbed at the time of turning, in order to brush off or destroy any nits of the fly which may happen to be deposited about the cheese. If there are cracks in the rind, or if the edges of the bandage do not fit snugly, they should at once be attended to, since it is at these points that the fly is most likely to make a safe deposit of its eggs."

**Filling up the Cracks.**—"The cracks and checks in the cheese should be filled up with particles of cheese that have been crushed under a knife to make them mellow and plastic. When once filled, a strip of thin, tough paper, oiled and laid over the repaired surface, will serve as a further protection of the parts. The cheese in the checks soon hardens and forms a new rind. Deep and bad looking checks may be repaired in this way, so as to form a smooth surface, scarcely to be distinguished from the sound parts of the cheese. It is a great mistake to send cheese that have deep checks or broken rinds to market; for in addition to their liability to be attacked by the fly, they have the appearance of being imperfect, and are justly regarded with suspicion."

**Boxing and Packing.**—"In boxing cheese, whether for export or the home trade, the greatest care should be taken to have the packages well made, and with an extra band on the lower edge. Cheese should never be sent to market until they have properly ripened, and they should be placed in boxes that fit—boxes that slip down easily over the cheese, but not so large as to allow 'shaking,' or a movement from one side to the other in the box, nor in so small a package as to prevent their being readily removed from the package without breaking it. Good, substantial scale-boards should be placed on both sides of the cheese, and no other material is so well adapted to the purpose where cheese is to be exported, or is to remain some time in the package during its transit to market. For short distances heavy straw paper may be used, but care should be taken not to pack with newspaper, as the moisture from the cheese will reduce it to a pulp, giving the cheese a very bad appearance on removal from the box.

When the cheese is in place, the sides of the package should come up just even with the top surface of the cheese. If it is below this surface the cheese will be liable to be broken and marred about the edges. If the rim of the box be a little higher than the cheese, it should be trimmed down after the cheese is in the box with a sharp drawing-knife, and then covers that fit closely should be adjusted. Sometimes the boxes are very imperfectly made, with loose-fitting covers that are liable to fall off in rolling the cheese from the scales, or in moving from place to place. In such cases the covers are sometimes tacked in place with nails, but when nails are used, care should be taken that they do not reach through the wood and into the cheese.

The boxes should be neatly branded with the name of the factory, or if from farm dairies with the name of the dairyman, and for this purpose stencil plates are most convenient, while the lettering makes a neater appearance than when the names are burned on with branding-irons."

**Profits of the Dairy.**—The products of the dairy are among the most useful and delicious articles of diet. In these days when oleomargarine is disguised as butter, and when lard, cotton-seed oil, and other adulterants are mixed with cheese, and a conglomerate of skim milk, water, chalk, and burnt sugar is palmed off to customers as pure milk, dairy products of the best quality cannot fail of being appreciated by consumers, and the demand for this quality far exceeds the supply; hence, being standard articles of commerce, they will always be in demand, and command good prices. Dairying, for the last twenty years, has been very remunerative in this country, and is rapidly becoming more so. Besides the great demand at home, there is also a large demand abroad. England, one of the wealthiest nations on the globe, is desirous of procuring our surplus dairy products. The annual importations of butter and cheese in England amount to more than \$75,000,000, while the demand at home is constantly increasing. There is no danger of the market being cloyed, and when a good article is produced it will always find a market. Mr. Willard sums up the requisites of profitable and successful dairying as follows:

"In summing up the requisites for successful dairying, I would say: 1. Make a good selection of stock adapted to your wants; then, whether the animals be thoroughbreds,

grades, or common cows, test the milk of every cow as to quantity and quality. 2. The next important step is care and feed. Nothing pays better than kind treatment. Cows should have clean, comfortable, well-ventilated stables. They should be driven leisurely—never faster than a walk; never whipped or beaten under any circumstances; they should never be worried or fatigued by dogs, and a uniform kindness should be shown, extending even to the tones of the voice. Let the attendants pet the animals daily, handling them tenderly, and gaining, if possible, their entire confidence and affection. Harsh treatment, neglect, and want of care not only lessen the quantity of milk, but not unfrequently render it unwholesome, and even poisonous. Numerous instances can be pointed out where cows that have been whipped, frightened, or in other ways abused, have yielded milk that has caused disease and death to persons using it. 3. Cows, to make good returns in wholesome and rich milk, must be fed well. The sweet and nutritious grasses growing upon old pastures are among the best of all foods for the production of good milk. When ground grain or meal is to be fed, one of the best mixtures is ground oats and bran, or ground oats and peas. Pea meal and bran mixed promote a good flow of milk of excellent quality.

When pastures are inferior or scanty, rations of the above may be fed to advantage, while the cows may be soiled with fodder corn, green clover, and the like, as supplementary to pasturage. The use of corn meal in summer is not so well adapted for feed as it is in cool weather. In fall or winter it makes an excellent ration with ground oats and bran. Roots, in their season, are also valuable—carrots, mangolds, and parsnips being among the best for good-flavored milk.

4. As milk is composed of eighty-seven parts water, with its other constituents, it is of the utmost importance that clean, fresh water be supplied to cows in such abundance that the animals can obtain it at will, and are not required to travel long distances to slake thirst. Stagnant water, or that from sloughs, cesspools, or other filthy places, injures the milk of cows partaking of it; and, if such water is mostly depended upon for the dairy, neither first-class butter or cheese can be produced. When springs and streams cannot be had, wells should be dug for supplying stock with water; and, by having pumps worked by wind power, good, clean water can be kept before the stock at small expense and trouble.

5. Having made provision for obtaining good milk, the all-important requisite to be considered is cleanliness. Everything about the dairy, the pails and utensils, must be kept scrupulously neat and clean. In washing dairy utensils, something more than cold and warm water will be required; the use of steam, or water *boiling* hot, must be employed to kill the germs of ferment that will accumulate from day to day in the corners, seams, and other parts of the utensils and implements. The milking must be done in the most cleanly manner. Immense quantities of bad-flavored goods result from careless milking, whereby droppings from unclean udders, particles of manure, and other filth are allowed to fall into the milk while milking.

Again, the milking stables are often badly ventilated, and are foul with emanations of decomposing filth; and, as milk absorbs these gases with great facility, good milk is often injured before it leaves the stables. Milk should at no time come in contact with offensive odors, and care should be taken where the dairy buildings are located, so as to escape the fumes of the stable, the pig-sty, or other decomposing form of vegetable or animal matter.

These few points are the stepping-stones to success in the dairy, and cannot be ignored with impunity."

Stock fanciers have done much towards the promotion of agriculture and its interests throughout the civilized world, and consequently the increase of national wealth and prosperity; and such men as Bakewell, Collings, and their congeners may be regarded as public benefactors, for they have devoted their means, time, talents, and energies towards the improvement of domestic animals of all kinds, and to their untiring devotion to this cause the farmers of to-day owe their fine stock and the profits thereby derived.

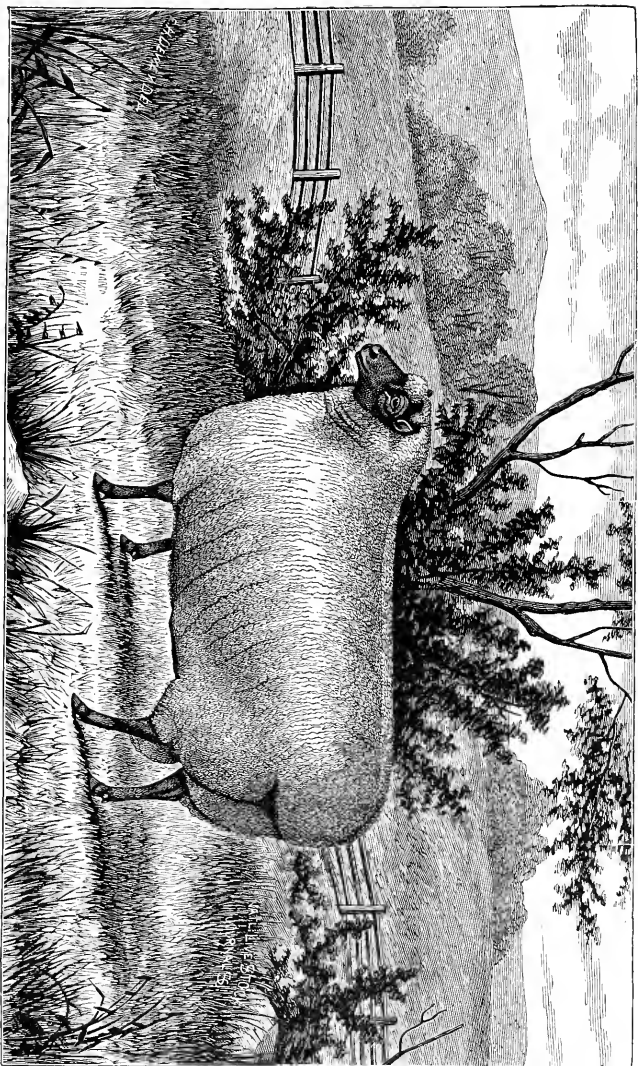
## SHEEP.

THE history of sheep husbandry dates back to a period almost as remote as that of the human race, and from that time until the present, sheep have been regarded as indispensable to man's comfort and welfare, whether among the nomadic, semi-barbarous tribes, or those races characterized by the highest civilization the world has ever known. Sheep husbandry has justly been regarded by all civilized nations as worthy a most prominent position in agriculture and commerce; in fact, the record of progress in civilization for more than a century past, shows a similar progress in the improvement of this useful domesticated animal. From the time of Abel, brother of the first born of the human race, who is referred to in the Scriptures as "a keeper of sheep," until the present, they have been regarded as a source of profit to the keeper; and when Fitzherbert as long ago as the year 1534 said, "Sheep is the most profitablest cattle a man can have," he not only expressed a truism suited to his own time, but an opinion in which the majority of agriculturists of the present day fully concur. If this were true of the flocks of his time, how much more so of the perfected breeds of the present period.

Their flesh is highly valued by all classes, is wholesome and nutritious, and furnishes no small per cent. of the meat supplied by our markets; their wool furnishes one of the most valuable materials for clothing etc. that can be procured, while they are an important source of revenue to the farmer, and also furnish a most valuable means of maintaining the fertility of his lands. In some countries they are raised principally for their wool; in others for their flesh, where mutton is the principal meat diet. It is surprising to note the improvements that have been made in this animal even during the past century, those bred a hundred years ago presenting a very ungainly appearance, with long legs, the fleece being small and of an inferior quality; they also yielded a smaller amount of meat of poorer quality, and required a long time to mature. By careful and judicious propagation, new breeds have been produced that supply wool of the long and fine fiber, with a much larger proportion of profitable meat of better quality, and with quickened growth and maturity, which latter fact is of no small import to the farmer respecting the profits to be derived from rearing them. Perhaps no animal in the brute creation, unless it be the dog, exhibits a greater diversity of character than the sheep. This variation is seen in form, size, color, length, and texture of wool etc., and no animal is more widely distributed throughout the different zones and climates, or subsists on a greater variety of food. It is found in every latitude from the equator to the arctic, on the bleak shores and mountains of Greenland, and the burning deserts of Africa, and subsists upon grasses, shrubs, weeds, grains, roots, leaves, barks, etc. In some countries where the winters are extremely severe, it is said, in times when other resources fail, to subsist upon fish or flesh, as is often the case in Lapland. When driven to great necessity from hunger, sheep have been known to eat their own wool. Numerous instances of the latter kind have been known where they have been temporarily covered by an avalanche of snow, or lost on the prairies in a severe snow storm. In the vast pine forests of Norway and Sweden, they often subsist on these resinous and aromatic evergreens when, owing to an extremely rigorous winter, there is a scarcity of other food.

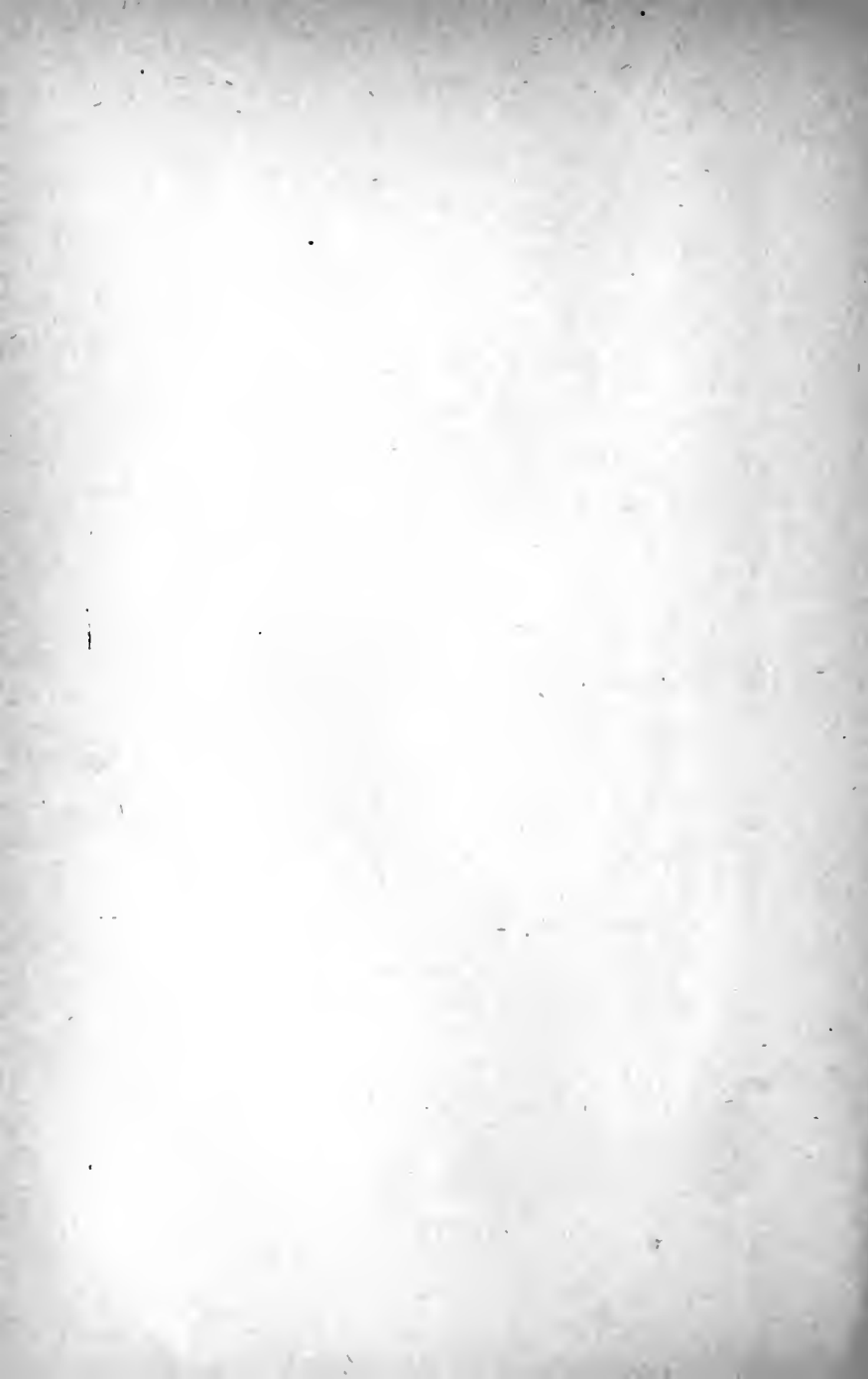
Sheep vary greatly with respect to size and other characteristics. Mr. Killebrew, of Tennessee, describes these characteristics in the following manner:—

"In the Orkney Islands they are so small as to appear like toys. Like the diminutive ponies of the Shetlands, neighbors of the Orkneys, they are brought to the warmer climates as a curiosity. By the side of the massive Cotswold or Southdown they appear very little like the same species. Some have long, tapering, straight horns, like the gazelle, while others have the huge spiral horns of the mountain, or big horns of the Osage Mountains. Others, again, are without horns altogether, as are most of the mutton sheep. The same difference exists



**OXFORD DOWN RAM "FREELAND."**

Imported and owned by T. S. Cooper, Oxford Park, Reading, Ohio. (Formerly of Linden Grove, Coopersburg, Pa.)



in regard to the tails. They have long, slender, vibrating tails, a broad, flat tail like those of Asia, or no tail at all, only a rudiment of one being discernible.

And thus with the covering. It hardly seems possible to connect the straight, hairy fleece of the Rocky Mountain sheep, and the long, combing wool of the Leicester or Cotswold, in the same animal. In Madagascar the sheep have short, hairy wool, hardly to be considered wool at all. In Lincolnshire it is long and coarse. In Saxony it is almost like silk, fine, curly, and lustrous. In Angola it is furry and soft as a rabbit's fur. Nor does the diversity stop here. In our own country we meet with the white and black sheep. About the Cape of Good Hope they are gray, dun, brown, buff, blue, and all intermediate shades of color. This great difference of color results from long breeding under many different climates and modes of feeding.

The uses to which these animals are applied seem to partake of the great diversity of their characteristics. The meat forms one of the standard dishes of the world. For luscious juiciness, ease of digestion, and delicacy of flavor, it has no equal. Agreeable alike to the invalid and to the laborer, it is eagerly sought by all classes. Nor is its flesh the only thing about it that forms a diet of man. Some nations use, to a large extent, the milk of sheep as well as of cows and goats. Excellent cheese is manufactured from it, and its use is thought by some physicians to be a specific diet in obstinate cases of dyspepsia. Even the wool is considered a choice dish by some of the Highland clans of Scotland. They scorch it to a crisp brownness, and eat it with great relish. The use of ewe's milk in preparing cheese, butter, and curd is alluded to in the Book of Job. The writers of profane history often speak of ewe's milk. The ewe's milk cheese has a sharp, strong taste, that, like Limberg cheese, commends itself to the taste of many people. It is often mixed with cow's milk in the manufacture of some brands of cheese, to give it a tartness not given by cow's milk alone. The butter is a pale yellow, less firm than cow's butter, and becomes rancid much quicker. The milk is thicker than cow's milk, but in other respects resembles it very much, both in taste and appearance.

The nomadic tribes of Asia live almost exclusively on the flesh of sheep, and when a patriarch assembles his family to the one meal of the day, it is generally around a large tray containing a single sheep, which serves them for meat and bread."

We believe the use of ewe's milk for dairy purposes has never been known in the United States except by a few Welsh and Highland emigrants.

Abraham and most of ancient patriarchs were shepherds. In the simple and beautiful sketch of Rachel we are told that "she came with her father's sheep, for she kept them;" and respecting the seven daughters of the priest of Midian, they "came and drew water for her father's flocks." Job had 14,000 sheep. Moses and David at one period of their lives followed the occupation of the shepherd.

While shepherds were "abiding in the field keeping watch over their flocks by night," the birth of the Saviour was announced to them. They were often used in sacrifices, and among the sacred writers were the symbols of purity and gentleness. Our Saviour is designated "the Lamb of God that taketh away the sins of the world." Homer, Horace, Vergil, Plato, Herodotus, and other famous writers of antiquity make frequent and pleasing allusions to sheep, indicating the attachment and estimation with which they were regarded by the people of that time. The improvement of sheep is supposed to have been commenced in the middle ages.

Spain and Portugal are justly entitled to the credit of having made the first improvement in these animals with reference to their wool, these two countries for more than two centuries, at one period, having been the most enterprising nations of Europe. At that time they greatly excelled in the production and manufacture of wool.

Flanders for a time manufactured most of the wool produced by Spain, Portugal,

France, and even England, but by a course of legislation with reference to the protection and increase of wool and its manufacture, England to-day takes the lead among nations in this enterprise. During the increased interest in sheep growing, and the improvement of wool in these countries at that time, and while the mania was at its height, great care was bestowed upon these animals, which to the present age would seem ludicrous. The flocks were carefully watered and tended, and the finest specimens selected and housed. Sacks were sown on their bodies, and the wool was frequently washed in wine and combed.

By such careful management for a few generations the fleeces became greatly improved in texture, fineness, and softness, but the sheep became in consequence less robust and considerably reduced. The improvement of the form and size together with the fleece, is of a more recent date, and since the increased demand for mutton, as an article of food; as a result, we now have these superb breeds that produce both wool and mutton of the best quality, and also in large quantities.

**Importance of Sheep Husbandry.**—Though the income from sheep husbandry in our country adds much to our national wealth, yet it might be said, when compared with England and our facilities for this enterprise,—that it had here scarcely commenced, and is still but a small fraction of what it might and ought to be, owing to the extensive and superior facilities for this important department of agriculture. Importations of wool and woolen goods amount to many millions of dollars annually, and if this money remained at home instead of being sent to a foreign country, it would materially increase our national wealth and prosperity. By producing our own wool and manufacturing it, this would be the natural result. The extensive areas of the west and many portions of the south afford admirable opportunities for sheep raising at a little expense and large profit to the farmer.

Many of the leading men of the South are appreciating this fact and turning their attention to this business and the establishing of woolen and cotton manufactories. The Western States have long been engaged in the production of mutton and wool with immense profits to that section, but the production might be largely increased to the benefit of the entire country. The conducting of extensive sheep ranches is a characteristic feature of portions of the far west, where several thousand sheep are often kept in one ranch, a single herder sometimes managing 2,500 with the help of his faithful shepherd dog, and the leader of the flock, which is generally a Mexican goat, and whose lead the sheep will follow even though it be over the sides of a precipice. But they are generally well trained and evince much sagacity in wending their way from and towards the corral, which they know will protect them at night.

In the Eastern States sheep raising must of necessity be limited, but when practiced on a small scale even, and well managed, it is found to be profitable, requiring but a small capital invested and bringing quick returns. We trust the time is not far distant when we shall not only be able to supply all our extensive manufactories with wool of home product, and thus obviate the necessity of importation for this purpose, but shall have an amount to export for foreign manufacture that shall bring an immense revenue to the nation; the amount now exported being small compared with that of many other exported products.

Hon. John L. Hayes of Boston, Mass., Secretary of the National Wool-Growers Association, and editor of the Bulletin of the National Association of Wool Manufacture, says in relation to sheep husbandry as a means of settling new territories:

“Pastoral sheep husbandry is of the first importance to the nation as the most effective means of settling and improving the vast unoccupied lands of the new or vacant States of the West and South. Of all the products of agriculture, wool is most capable of transportation; or, in other words, the greatest value can be placed in the smallest bulk, in a form liable to receive the least injury in the friction of transportation. When the freight of wheat from Chicago to seaboard costs eighty per cent. of its value, of pork thirty per cent., that of

wool is but four per cent.; wool, therefore, may be grown with profit in the districts of the remotest interior favorable to its production."

Other arguments in favor of sheep husbandry, and which in fact, might be worthy of consideration of every farmer, may be summed up as follows:

A farm can be well stocked with sheep for considerably less money than with horses, cattle, or swine, and sheep will approach nearer to utilizing *everything* that is produced on the farm than any other animal; besides, with sheep less labor will be required in converting this food into the products of the stock, and the profits will be realized sooner and more frequently than will any other farm stock, except swine. Less expenditure is required for shelter and fencing, and less labor is involved in herding, where outside pasturage is accessible and preferred, as is sometimes the case on prairies and table lands, or extensive ranches. Aside from the above considerations, a fine income on the capital invested can be realized, without the sale of the stock, which is not the case with other animals, since the profits of the wool product alone, aside from that of lambs and mutton, make the enterprise a desirable one.

**Breeds of Sheep.**—The distinct breeds and sub-varieties of sheep are very numerous. It would be impossible to enter into a description of each, as our space will not admit, neither would it be of special advantage to the general farmer; we shall therefore confine our descriptions and observations principally to those breeds that are considered the most valuable by agriculturists and breeders generally. Some English writers class their different varieties under three distinct heads, viz., the heavy breeds of the plains, such as the Cotswolds, Lincolns, Leicesters, Teeswaters, etc.; those adapted for downs and similar localities, such as the Oxford Downs, South Downs, Hampshire Downs, Shropshires and Dorsets; and the mountain breeds, which are the Cheviots, and the Blackfaced or Heath breeds.

Besides these, there are valuable cross-breeds that are constantly acquiring increased importance. The general classification of breeds in this country is not according to adaptation to their respective habits, but more particularly with respect to the length of the wool; thus, we have a class of fine-wooled sheep, such as the Merino, for instance, which is considered the standard and best of the class,—the distinguishing characteristic of which is its very fine short wool; then there are the British short-wooled breeds, or what are sometimes called "the middle wools," comprising a class whose wool is *only* of medium length and fineness, called the "middle wool" class, such as the Oxford Downs, South Downs, and the Hampshire Downs, etc.; beside these, there are the long-wooled class having fleeces of very long wool, though the fibre is rather coarse, of which the Cotswolds, Leicesters, and Lincolns are the best examples. Aside from the distinct breeds, there are a great variety of grades and natives, some of which are very valuable.

Many of the desirable qualities both for wool and mutton are secured by crossing those breeds, each of which possesses one of the qualities desired in a marked degree, thus combining the essential qualities; for example, if a farmer wishes to combine the two qualities of producing wool and mutton by a cross, this can be accomplished by crossing a Merino ewe with the Lincoln, Cotswold, or Leicester ram, thus securing a strong and hardy constitution with good size, and a grade of wool that in many localities will bring as good a price as the wool of finer fibre.

The native flocks are greatly improved by crossing with breeds of superior quality; still, the thoroughbred sheep are generally to be preferred, and they are now sold at prices that come within the means of most farmers; besides they increase so rapidly that quite a flock can be produced in a few years from a single pair.

Native blood should by no means ever be introduced into a flock of thoroughbred sheep, as it will be a great evil, and result in deteriorating the value of the flock. We do not recommend natives in forming a new flock, but where the farmer has a flock of natives in his

possession. they may be used as a basis for an improved flock through the introduction of thoroughbred blood by judicious crossing. As a general rule the natives are far behind the standard breeds, although some are much better than others; the best only should be used as the basis of an improved flock, as many are of a very inferior quality.

Mr. Harris of Moreton Farm says he can always tell an American and an Englishman when they go to examine his flock; the Englishman looks at the form of the animal and begins to talk about the weight of the sheep; he never says anything about wool; if he gets form and weight of carcass, he knows the wool will be all right. The American examines first for wool; he looks at the length of staple and fineness of fibre, and lastly weight of carcass.

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## MERINO SHEEP.

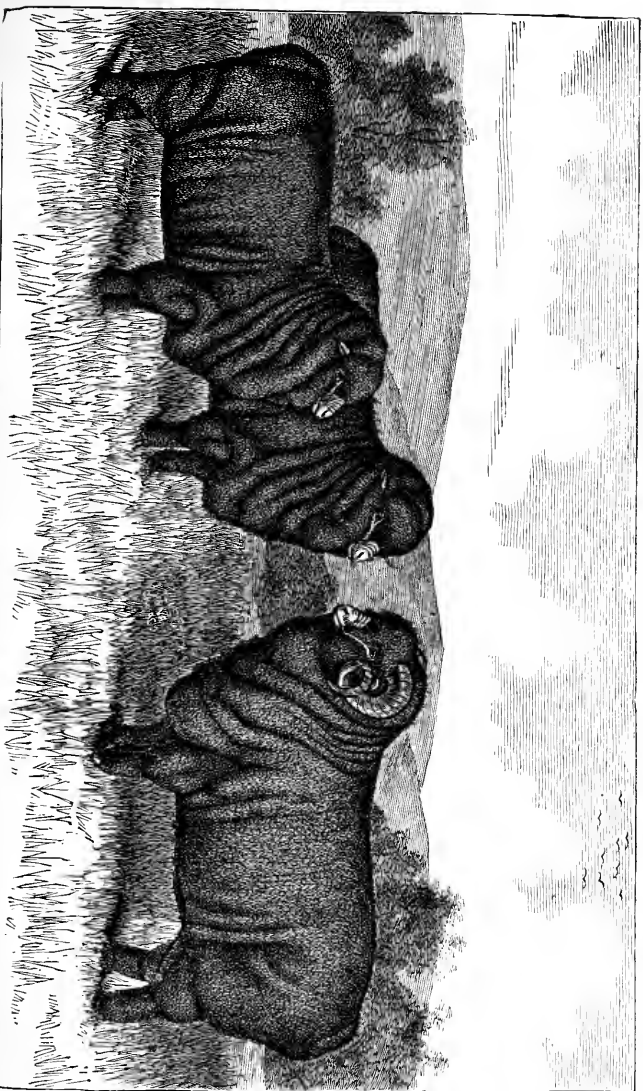
THIS breed is supposed to be among the most ancient race of sheep known, also the most widely disseminated at present. Various importations of Merinos were made into Sweden, Saxony, Germany, Denmark, Prussia, France, England, and other countries, from Spain before their introduction into the United States, the first authenticated importation of them that resulted in the propagation of a pure breed in this country having been made by Chancellor Livingston in 1802, he being at that time minister at the Court of Versailles. This importation consisted of two choice rams and ewes from the Rambouillet flock, and were sent to that gentleman's country seat on the Hudson. Subsequently various other importations followed, which resulted in disseminating eventually this valuable breed; but as is common with respect to any innovation, we find that when first introduced they were looked upon with distrust by the majority of farmers, and it was not until after several years had elapsed that confidence in the breed had become sufficiently established to result in their general dissemination.

It is reported by statements made by Mr. Livingston, that the breed had become so well appreciated in the year 1811, that the average price for Merino rams was \$1,000, and some were sold at a much higher rate. They finally declined in value, which resulted in a more general diffusion of the breed and its crosses throughout this and other countries.

The Rambouillets were first introduced into this country from France in 1801, the importation consisting of four choice rams. Other importations succeeded, and under good management they rapidly increased and became more generally known in New York, and some of the Western States. Their wool was, however, found to be coarser in fibre than that of the Spanish Merino, while they were not as hardy as some other branches of the Merino family. Others consequently took their place, and but few of the pure-blooded Rambouillets are to be found at present in this country. The different types of the Merino breed that were originally imported into the United States, have been more or less mingled together, so that there is now probably not a single unmixed descendant that could be traced to the original stock.

The improvement of Merinos has been very marked in the last twenty years, the aim of breeders having been in the direction of large and more compact frames, a better mutton-producing animal, earlier maturity, and a somewhat coarser, but heavier and more profitable fleece. So great is the change that has been wrought in this breed in many localities through climatic and other influences, that it is almost impossible to find a flock possessing precisely the same characteristics of twenty to thirty years ago, although bearing the same name.

Merinos are now represented in various types, embracing the American, French, Saxony, Spanish, Silesian, Australian, etc., all of which are valuable and in many respects similar, though slightly differing in some points, such as size of body, fineness of wool fibre, and length of wool, etc., caused by climatic and other influences.



**MERINO SHEEP.**

Property of G. W. Hunt, Greenwood, Ill.

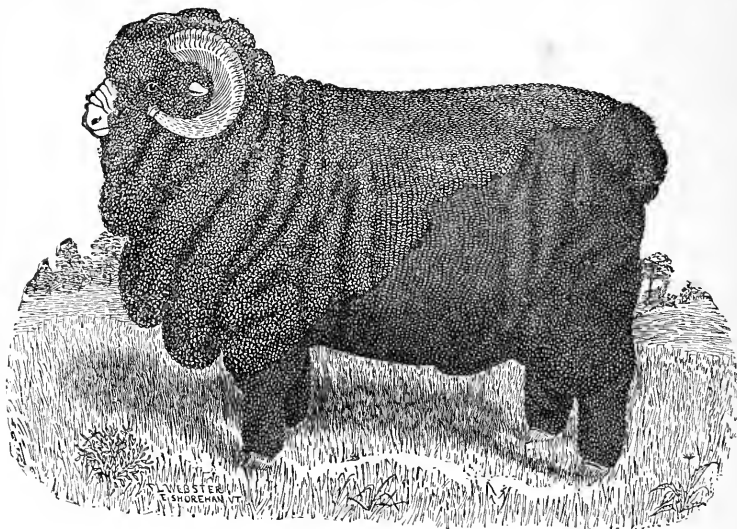


A change of locality, like that from their native habitat to the rich clover fields of Western New York or Ohio, for instance, produces a corresponding change, though gradual, in the breed, and forms a new type, characterized by a heavier body and fleece. The American Merino is a good illustration of this change. The ancient Greeks, having no cotton or silk, and but little linen, sheep's wool was of necessity the principal material from which their clothes were made; they accordingly took special pains and care to cultivate such breeds as produced the finest wool. Such breeds were those of the Greek city of Tarentum situated on the Tarentine Gulf. In order to render the texture of the wool still more fine, they covered their sheep with clothes during the winter, as they found by experience that exposure to the cold made the wool coarser. This practice of clothing the sheep during cold weather for several generations resulted in producing a very delicate breed with exceedingly fine wool. This product of Greek industry was transmitted by them to the Romans, and were crossed by them with rams imported from Africa, producing a stronger breed which combined the whiteness of fleece of the sire with the fineness of fleece of the dam, and thus the race was perpetuated. The scarcity of other fine textured sheep made these Spanish sheep so valuable, that it is stated from authentic sources, that in the beginning of our era they were sold for \$1000 in gold per head, which was an enormous price for that period, when money possessed much more value than at present. The same authority says:—

“When the barbarians invaded Italy, these sheep were all exterminated, while the greater portion of the Roman possessions were laid waste. But in the less accessible mountain regions of Spain, the Moors preserved the breed; and it is to them that modern Spain owes the Merino sheep, which are the direct descendants of this cross breed of the Greek and African ancestors. It is a valuable inheritance, too, which that country owes to the combined Greek, Roman, and Moorish civilizations, and of which our California wool growers also reap the advantages, by the prosperity of this breed of sheep, which was there a few years ago.”

The prominent characteristics of the Merino are the abundance and fineness of its wool, its crimped or spiral form, and the large quantity of yolk it contains, giving it greater softness than that of other longer-wooled breeds. The yolk is a peculiar substance secreted from the skin of all sheep, and which is contained in the wool to a greater or less extent. It is of the nature of potash soap, and may be washed out by water alone with which it forms a kind of lather. On the outside of the fleece the dust adhering and mixing with the yolk forms, when combined with the compactness of the wool, a kind of crust which offers considerable resistance in repelling snow, wind, and rain. On opening this outer crust, the wool of the Merino is found of a golden tint and soft and glistening with yolk. The abundant supply of yolk in the Merino enables it to endure exposure better than most other breeds. Though natives of a warm climate, they soon become acclimated to an extreme cold temperature, and are successfully reared as far North as Sweden; their wool in such climates however loses somewhat of the fine texture that characterizes it in warmer regions. The Merino is also of vigorous constitution and very long lived, sometimes producing healthy lambs at the age of twelve years and even older; though not so prolific as some breeds, they breed, however, regularly, until seven or eight years old. They are healthy and hardy and will thrive where some breeds would utterly fail; will live on light pastures, endure heat remarkably, and herd profitably, usually doing well in either large or small flocks, and are remarkably adapted to very warm or cold climates. Notwithstanding the health and longevity of the breed, the lambs when first dropped appear more delicate and feeble than those of any other breed, but after a few days they seem equally strong as others, and the percentage of loss from disease after this period is usually less in a Merino flock than those of others. They are, however, slow in maturing, and do not generally cease growing until three years old, which renders them less desirable than some others as mutton sheep. They are considered by breeders very valuable to cross with the common, native stock, as they readily transmit their good qualities, and even greatly improve a flock of native sheep. The general average of lambs is about eighty per cent. of

the ewes. The Merino is described generally as a small-boned sheep of medium size, compact form, light in the shoulders and chest, and in this respect more deficient in form than the best mutton breeds, being better for wool-production than mutton. The weight of ewes will average from sixty to seventy pounds; the rams varying in weight from one hundred to a hundred and fifty pounds. The group of this breed of which we insert an illustration represents truly fine animals, the property of G. W. Hunt, of Greenwood, Illinois, who has been a successful breeder of this variety for sixteen years. One of the ewes represented recently clipped 16 $\frac{3}{4}$  lbs. of wool, and the other 15 $\frac{1}{2}$  lbs., both only of one year's growth.



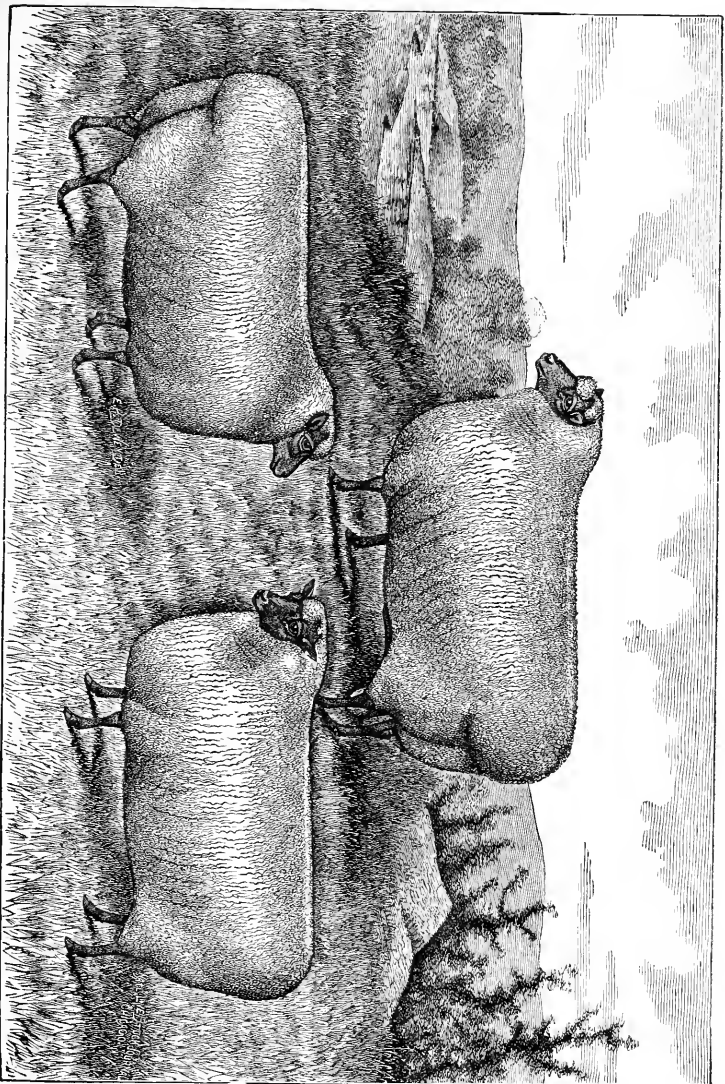
MERINO RAM "JASON."

Owned by Messrs. Dean and Jennings, West Cornwall, Vermont.

The above illustration represents the famous ram "Jason," bred by the late Col. E. S. Stowell, and now owned by Messrs. Dean and Jennings of West Cornwall, Vermont. This valuable animal composed one of the flock to which was awarded the gold medal at the Vermont State Fair in 1881, and is one of the finest specimens of the Spanish Merino race of sheep in this country.

## OXFORD DOWNS.

**T**HIS comparatively new and popular breed was produced by a successful course of cross-breeding of Cotswolds with the Hampshire ewes, with occasional mixture of Southdown blood, the Cotswold ram and Hampshire Down ewe being the chief material which, by judicious blending and careful selection, have resulted in a breed of sheep that, all things considered, can hardly be surpassed for the production of both mutton and wool. This breed was produced about fifty years ago, in the county of Oxford, England, from which it takes its name. Though comparatively but recently introduced into the United States, it is gaining favor rapidly, and bids fair to become widely disseminated



**OXFORD DOWN YEARLING LAMBS.**

Sired by "Freeland." Bred by and Property of T. S. Cooper, Oxford Park, Reading, Ohio. (Formerly of Linden Grove, Coopersburg, Pa.)



throughout the country. The aim of the originators of the breed was to obtain an animal that possessed the weight of the long woolled sheep, with the quality and characteristics of the Downs, and the best types of the breed show how admirably they have succeeded.

**Description.**—Good English authority prescribes that the Oxfordshire Downs should have “a nice, dark color, the poll well covered with wool, adorned with a top-knot on the forehead; a good fleece of wool, thick on the skin, but not too curly; a well-formed barrel, on short, dark legs (not grey nor spotted), with good, firm mutton.” The weight of the wool for a whole flock is estimated to be, on the average, about seven pounds per sheep, while rams have been known to cut as much as twenty pounds per shearing. The Oxford Down is characterized by great hardiness of constitution, large size, heavy fleece, facility for fattening, and excellent mutton. It is adapted more particularly for mixed soils, and bears close stocking and confinement well. They are larger than either Southdown or Shropshires, bear more wool and of a longer staple, their wool being long enough for combing, and nearly as long as the Longwools, while they have the dark faces which characterize the Southdown, although not quite as dark as the latter. It is difficult for one not an expert, or familiar with the breed, to distinguish between the Shropshire and the Oxford Down.

Mr. George Gardener, of Canada, an English farmer of extensive experience, states his opinion of the breed as follows: “Having a thorough knowledge of the Oxford Downs, from living within a few miles of the part where this breed was originated, I can state positively that there is not a more profitable variety in existence. These sheep are a complete answer to all those who will not allow that good ever arises from crossing, as they were a direct cross between the Cotswold on one side and the Hampshire Down on the other; and the Oxford Downs are now an established breed, and continue to be distinct, and follow true to parentage, without any uneven look in the flock which will occur at the commencement of a direct cross between two pure breeds. . . . The Oxfordshire Down is decidedly the largest of all the Down species, and cuts more wool; and the reason that they continue to gain favor in England is that the mutton from any kind of Down sheep makes more per pound, and is always more readily sold. The Oxford Down lies better within hurdles, and comes to very early maturity,—also cuts a heavy fleece, as well as being of superior quality. Any one may depend upon them for being a very profitable breed, if well fed; for they will cut 10 or 12 pounds of wool at 14 months old, and weigh 120 pounds, dressed weight, on turnips and hay, if the hay is cut when the grass is coming into bloom.”

They are a large, handsome sheep, and aside from the profits resulting from breeding them, are farther satisfactory in an æsthetic point of view to a farmer who has a keen appreciation, and an eye for beauty and fine points in an animal. Like most of the thoroughbred stock, they may be used with great success in improving the native stock of the country.

A cross upon the common sheep or grades of other varieties results in early maturing lambs for city markets, or when kept for general use, they will develop into a flock characterized by many desirable qualities, which the average farmer can turn to profitable account, and are worthy the attention of breeders so circumstanced as to take advantage of the growing taste in the country for first-class mutton. A fine representation of this breed is given in the cut of the noted ram “Freeland,” while that of a group of his lambs proves with what uniformity the breed now repeats itself. A few facts relative to this sheep may be of interest to the general farmer.

Mr. Cooper, the former owner of “Freeland,” paid in 1876, eighty-five guineas (\$500 in currency), for the rental of the then two-year old ram for the season, besides all expenses of passage to and from America, including the shepherd's expenses that accompanied him, the insurance, etc. On arriving from England, his weight was 425 pounds. He won several prizes in England amounting to over \$500, but has never been exhibited in this country except at the Centennial, when he won first in his class, as well as sweepstakes as the best

ram of any age in the middle wool class, and was the heaviest sheep exhibited at that time. Mr. Cooper did not permit the animal to return to England, but purchased him the following spring.

The attention given at the present time by our prominent importers and breeders towards improving and perfecting all kinds of farm animals, cannot fail of great good to this branch of the agricultural interests of the country.

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## SOUTHDOWNS.

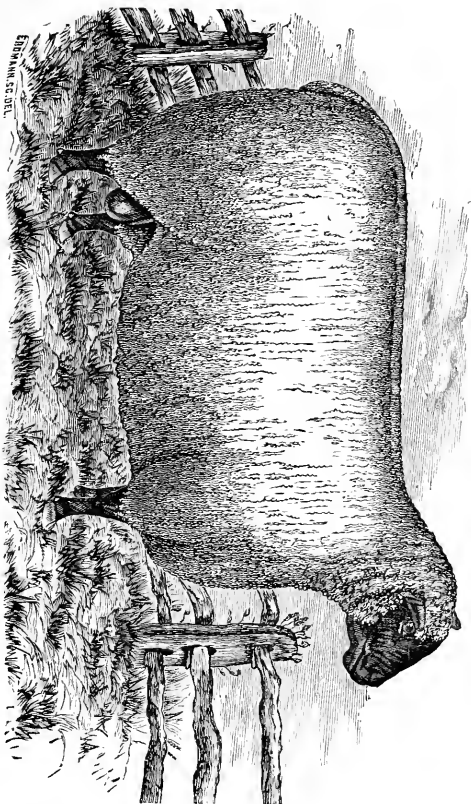
**T**HIS breed of sheep has for a long time existed in England in the region of a range of chalky hills or downs, commonly called South Downs, from which the breed derives its name. During the last century, great improvements in this variety have been made, which have been brought about by careful breeding; consequently the Southdowns of to-day are much superior to those of a hundred years ago, in respect to size, form, quantity and quality of wool, and mutton. According to good authority, the changes that have been effected in the true Southdowns have been converting the former speckled faces to a uniform tint of brown or fawn color, sometimes approaching a gray; the forehead and cheeks have been partially covered with wool; a greater symmetry of form has been obtained, with increased size and fattening aptitude, together with improvement in quantity and quality of wool.

About a hundred years since, Mr. John Ellman, of Glynde, Sussex, commenced patiently and perseveringly to attempt the improvement of the native sheep of the downs, and after a few years succeeded in bringing them to a great perfection with regard to a more symmetrical and profitable form, superior flesh and fattening powers, and early maturity, without injury to the constitution. His success was so great that he formed a flock from which the best blood of the breed has since been derived.

Other breeders, particularly Messrs. Webb and Grantham, have made further improvements, beginning where Mr. Ellman left them, and succeeded in often bringing the weight of rams to two hundred pounds. The wool, formerly short, has been lengthened considerably, and is now used in England as a combing wool, the quality of the best types of the breed being little inferior to that of the Merino.

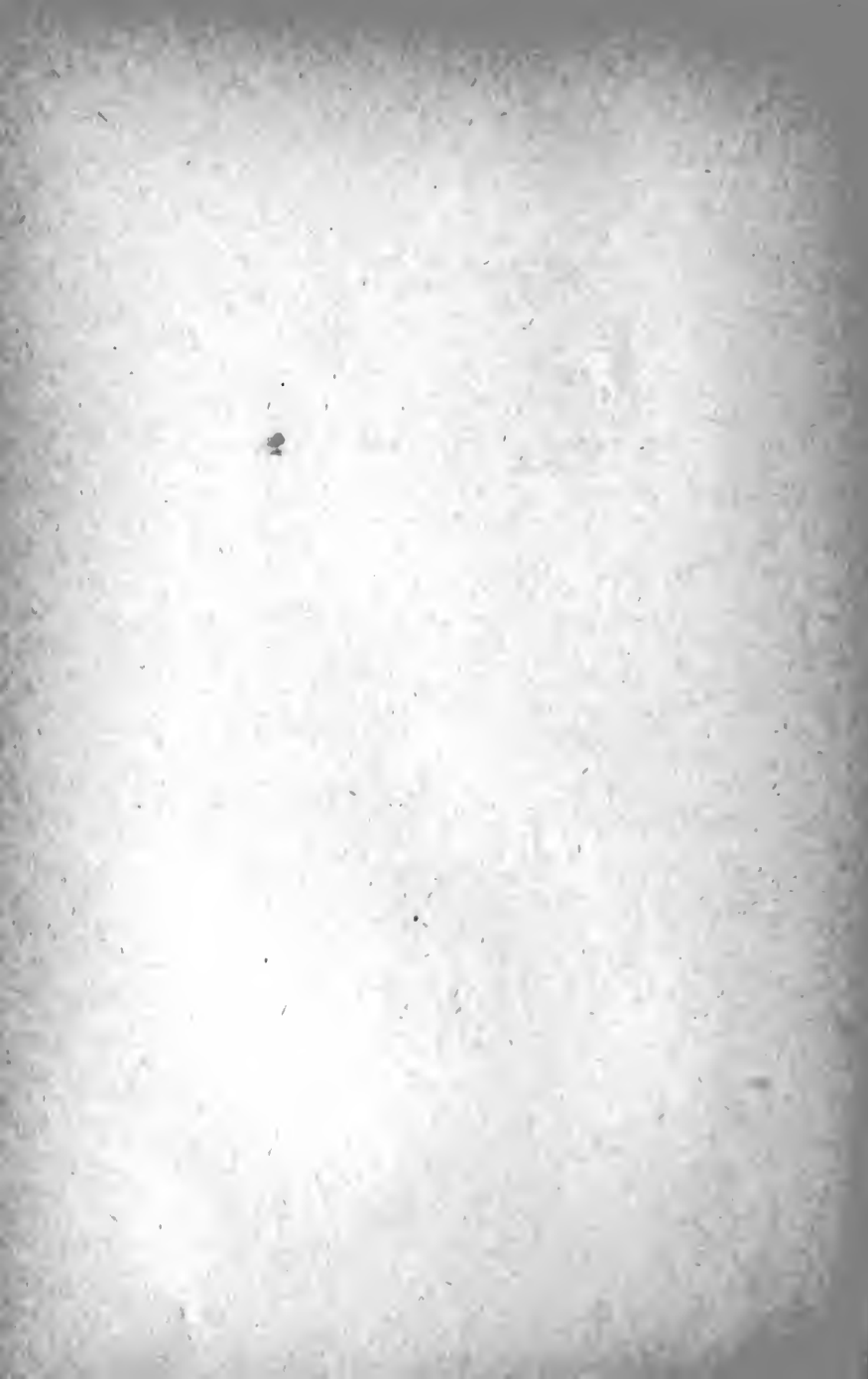
**Description.**—An English writer describes the Southdowns as follows: "They have a close, set fleece of fine wool, weighing, when the animals are well fed, about four pounds; their faces and legs are of a dusky brown color, their necks slightly arched, their limbs short, body broad and compact, offal light, and the buttock very thick and square behind. They are less impatient of folding, and suffer less from a pasture being thickly stocked than almost any other breed."

The Southdowns will subsist on light pasturage, but of course thrive best when well fed; and, where wool and mutton are both desired, are a profitable breed for any farmer. They attain early maturity, are hardy and prolific, often producing two at a birth; in this respect they surpass the Merinos. Breeders of experience state that a hundred ewes will, on the average, produce a hundred per cent. of lambs, the twins occurring as often as barrenness in ewes. The lambs are large, hardy, and mature early; when eight months old they are said to dress from sixty to one hundred pounds. The sheep fatten readily, and take on the fat evenly over the entire carcass. They are not, however (as is the case with all the highly-improved English breeds), as long-lived as the Merinos, and may be considered in their prime at three years. The ewes should not become mothers until two years old. Though naturally



**IMPORTED SOUTHDOWN BUCK, "LORD WALSINGHAM."**

Property of Benson, Manle & Co., Philadelphia, Pa.



an upland sheep, they thrive equally well in lower sections, and are much in favor in many of the Southern States, as well as other portions of the country. They are used for crossing with the native sheep with good success.

**Hampshires**, sometimes called Hampshiredowns, as they belong to the family of Downs (or sheep that are natives of the downs of England), are an old and well-established breed, much resembling the Southdowns in general appearance, having the dark-colored face and legs characteristic of that breed, but are considerably larger than the latter. They are of a good constitution, hardy, possess an aptitude to fatten with a smaller amount of food than some breeds, mature early, and are good wool bearers; the average weight of the fleece being from five to six pounds, the wool being of fine quality and medium staple. The average yield of lambs is said by those familiar with the breed to be about ninety-one per cent. per annum, and the mortality of the ewes five and one-half per cent., the above average being from statistics of 10,000 Hampshires for three successive years. Like all the Down breeds, the Hampshires herd well, and a larger flock can be kept together than the larger, long-wooled varieties, while they are valuable for crossing with the native sheep and grades of our country.

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## SHROPSHIRE.

**T**HE Shropshire is another branch of the Down family, partaking of the general characteristics of the Southdown, although much heavier both in fleece and body, and also much more robust. It is said to be the most prolific of all breeds, the average rate of increase in some flocks of pure Shropshires often being 150 per cent., while the product from the cross of the Shropshire ram on half-bred, long-wool ewes frequently reaches 200 per cent. Of course the increase in any breed is materially modified by the nature of the land, quantity and quality of food, and the general care and management of the flock, and no greater mistake can be made with regard to sheep husbandry than in supposing that heavy fleeces, good mutton, and a large number of strong, healthy lambs can be produced from barren land and scanty food. No animal whatever can thrive without a good supply of proper food.

We know of one instance of remarkable prolificacy in this breed, where a Shropshire ewe belonging to a small flock of about thirty sheep in the County of Waterford, Ireland, produced *five* lambs at one birth, and all of them strong and healthy! This is of course a remarkable case, and its like would probably not occur in many thousand instances, although twins, and triplets even, are very common with ewes of this breed. Mr. Samuel Smith, of Hinsdale, N. H., recently raised three lambs from a Shropshire ewe, which he sold for \$18, and the wool of the ewe for \$1.50, making the total profit derived \$19.50. The prolific tendency of the Shropshire is a point of great importance with the breeder, as it materially increases the profits in furnishing early lambs for the market. They are also good mothers, and generally have an abundance of milk for their young, in this respect differing from many of the large breeds.

We give the subjoined relative to this breed from the *London Field*, which is considered good authority on all subjects of stock raising:

"The Shropshire sheep, though of comparatively recent origin, are at the present widely spread and much valued. On a small farm, we purchase every autumn, forty Banffshire ewes — a description of border Leicester, with a slight Cheviot cross — and serve them with a Shropshire ram. Last year thirty-six ewes produced seventy-eight lambs, all sold fat.

This season the forty ewes produced eighty-two lambs; but, owing to unfavorable causes, we lost ten lambs, or such portion of the same as have not been already treated with mint sauce. This prolific tendency is a point of great importance, for it is not with the Shropshires as it is with some of the larger breeds, that a fine single lamb is more esteemed than a double. The ewes are good mothers, and can do justice to their offspring; moreover, it is always profitable to assist nature by nutritious diet. Next, the Shropshire is a hardy sheep, suitable for a large range of soils, and capable of close folding, without sensible loss of size. The yield both of mutton and wool is far greater than from the Southdown, or other short wool breeds. Hampshires may arrive at greater weight, but they require more time. The proportion of bone and offal is greater, and the wool much less."

Mr. J. R. Dodge, so well and favorably known as an agricultural writer, describes the breed as follows: "This breed is now of larger size than the Southdown, with longer face of uniform dark tint, a full and spirited eye, spreading ears of good size, and a forehead rather flat and well wooled. They are very prolific, the ewes generally bringing doubles if well cared for, and, what is better still, the mothers are amply able to bring up the lambs in good condition. They excel the Southdowns in yield, both of mutton and wool. They scarcely attain the weight of the Hampshires, but reach maturity earlier, and have less bone and offal. Their fleece-weight is generally from five to seven pounds. The meat is like the Southdowns in fineness of texture, the presence of fat in the tissues, and richness of color. At twelve or fifteen months they will sometimes reach twenty pounds per quarter. They bear close folding well, are found hardy in moist climates, and will endure a wide range of soils and feeding."

They are peculiarly adapted for crossing with the long-wooled breeds, and readily impart their desirable qualities upon their progeny.

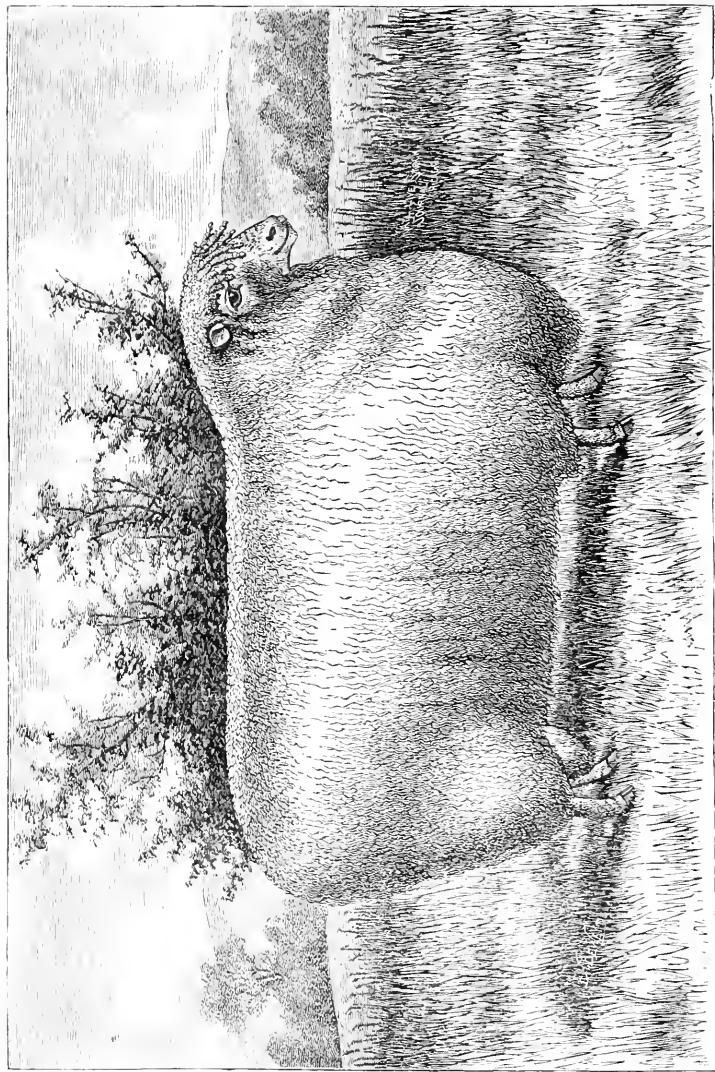
**The Long-Wooled Breeds.**—Of this class of sheep, the principal breeds are the Cotswold, Leicester, and Lincoln, the Cotswold in this country being the most numerous and popular; but in England, where they have their origin, Cotswolds and Leicesters are regarded with about equal favor.

The long-wooled sheep are the largest known and produce the best quality of combing wool, which is admirably adapted by its length and lack of felting properties to the manufacture of worsted, bombazine, etc.; besides, it is used in manufacturing blankets, carpets, and other coarse woolen materials requiring great length of staple in the wool. This class of sheep are also valuable for mutton, fatten readily, and are strong and hardy.

They are hornless, with white, open faces of very long wool of rather coarse fibre, are docile, but less timid than the Merinos and some other varieties.

These breeds are said to have been originally coarse, long-legged, and rangy, but always yielding large fleeces. About a hundred years ago the celebrated English breeder, Bakewell, made marked improvements upon the Leicesters, beginning by selecting the best animals of the flock, and by good feeding and general management, always selecting the choicest animals for perpetuating his flock, eventually produced a breed characterized by such an improvement upon the original stock as to render them, in all essential points, an entirely different breed, and one which the improved Leicesters of the present time furnish us a good type.





COTSWOLD RAM, "STANDARD."  
Property of T. L. Miller, Beecher, Ill.

## COTSWOLDS.

**T**HIS is one of the largest English breeds, and the most popular of the long-wooled class in the United States; it is also a breed of great antiquity. The improved race is slightly smaller than the original, owing, as is supposed, to the influence of the Leicester element in its amelioration. They were formerly called "Glo'sters," or "New Oxfords," and have been greatly improved during the last half century, by careful breeding. The qualities for which they are prized are the excellence and quality of the fleece for combing wool, their hardiness, docility, aptitude to fatten, and the great weight to which they attain; their chief defect, according to some English writers, being that the mutton is apt to possess an undue proportion of fat, and is not marbled (or has the fat distributed amongst the lean meat) like the Southdowns and some other breeds; still, other equally good authorities claim that the mutton produced by this breed is second to none in any respect.

The Cotswolds produce a heavier fleece than the Leicesters, though not of so fine a fibre; the ewes are prolific breeders and good mothers, generally having an abundant supply of milk for their lambs, which are large-framed and hardy. This breed makes a marked improvement when bred to the common sheep of the country, the first cross with a Cotswold ram often resulting in trebling the weight of the fleece, and at the same time greatly increasing the size and improving the form of the native stock; for this reason they are in great demand by those who, not having thoroughbred stock, wish to combine, as far as possible, both wool and mutton qualities in their flocks. They are also particularly valuable for crossing with the Downs and other short-wooled sheep.

Mr. Joseph Harris, the well-known breeder and agricultural writer, has found by experiment, that the cross produced by the use of the Cotswold ram on his Merinos has proved most satisfactory, and he highly recommends Cotswolds to those farmers who wish to produce a grade from a Merino flock.

The Cotswolds are considered by many breeders to be the hardiest of all the English breeds of sheep, as they are also the largest of all the well-established breeds.

The celebrated experiments of Messrs. Lawes and Gilbert have proved beyond doubt that the Cotswolds gain more rapidly, both in fleece and flesh, than any other breed, and also gain more in proportion to the food consumed than any other breed.

**Description.**—The Cotswold breed and the Leicesters are so nearly alike in external appearance, that to a novice in matters pertaining to sheep husbandry the distinction is difficult. The Cotswolds are larger, and usually have considerable wool upon the forehead, while the Leicesters have but little, being nearly bare-faced.

Gen. C. P. Mattocks, of Portland, Me., an extensive breeder and importer of thoroughbred stock, says respecting this point:

"In a Cotswold the inimitable foretop is an index of purity as well as of the wool-producing qualities. In fact the foretops in some of the best specimens of shearling rams are so heavy as to absolutely obscure the eyes, and remind one of the graceful foretop of a well-bred Morgan horse. Bare heads in Cotswolds should be discarded. There is a popular impression that a gray or mottled face detracts from the value of a Cotswold and is an indication of impurity, while many claim that sheep with such faces are hardier and better in all respects than the white-faced. Some of the best Cotswolds ever brought to this country were gray-faced. The sweepstakes ram of the St. Louis Exhibition of 1872, afterwards owned and successfully used by the writer, had a gray face. He reached the enormous weight of 445 lbs., and his offspring were worthy of him."

The following translation from a recent French publication of high authority contains a good description of this breed.

"From time immemorial, the hills of Gloucestershire, Eng., have been inhabited by a breed of rustic sheep, sheltered in winter beneath sheds, to preserve them from the severity of the climate of that pastoral region. It is from this latter circumstance that the breed takes its name (Cots-wold; i. e., camp of sheep cots, or sheds).

Before the advent of Bakewell, these sheep were noted for the whiteness and fineness (relatively) of their wool. At the commencement of the 16th century, Camden described the numerous flocks of sheep raised upon the hills of Gloucestershire as furnishing wool of remarkable whiteness, and of very fine quality, much esteemed and sought after by foreign nations.

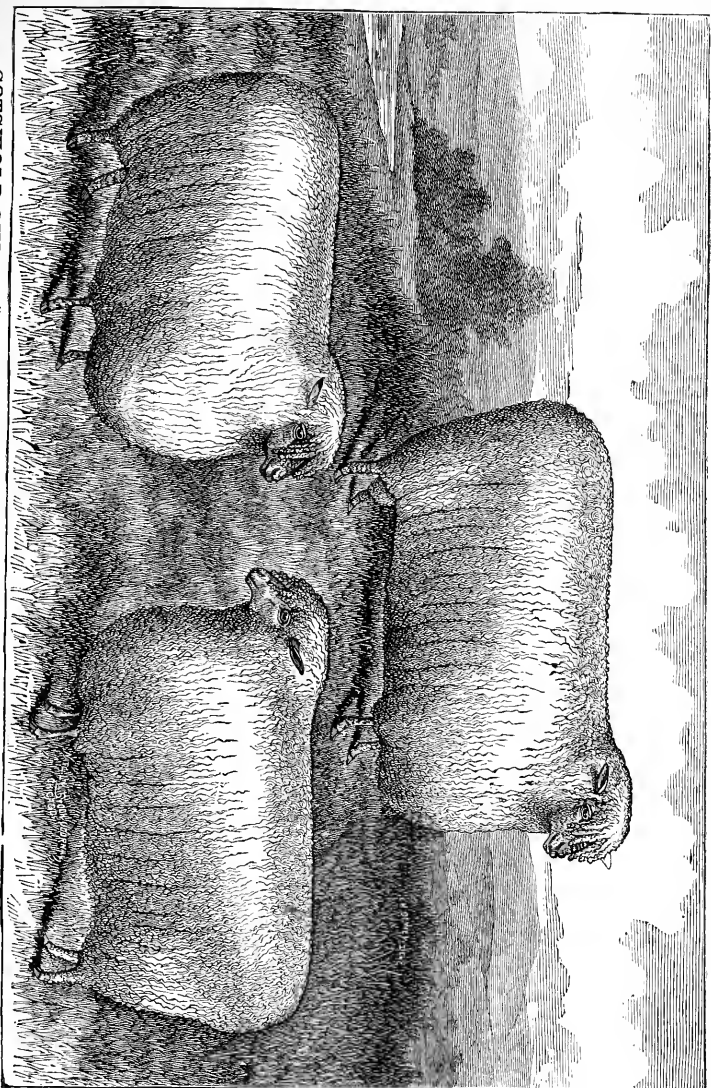
*Typical Characteristics.*—Forehead short, and not prominent; little prominence to the orbital arch; face long, slightly conical; the zygomatic crest prominent; lower jaw-bone has its branches close together, and rising again at an obtuse angle; the incisive arch large. In the living animal the muzzle is large and blunt; lips thick; mouth large; ear short, heavy, and falling to the front; head covered with wool to the rear of the orbital arch, and forming a point on the forehead; eye small, with upper lid drooping slightly.

*Secondary Characteristics.*—The wool of a remarkable whiteness—a whiteness which is not met with in any other breed—the hair long, smooth, and soft, forming locks that are pointed but curled; fleece more full than that of other long-wool breeds in general, extending under the belly, but not over the legs; stature very high; more robust than that of the Leicester breed; head relatively a little large; neck long, slightly formed, and puny; chest very large and prominent; shoulders strongly muscled; withers low and very thick-set; line of back slightly elevated; haunches well spread; rump long and pointed; hams rather lean; flank short; belly well rounded; body as a whole large, and in form of a parallelopiped, limbs well spread when the animal is standing. Notwithstanding the great development of skeleton, the aptitude for fattening is prominent. They are not so precocious as the Leicester breed.

As fattened for market, the Cotswold attains, commonly, a weight of eighty kilogrammes—(175 lbs.) Of the four lots exhibited at the International Fair at Poissy, in 1862, one, composed of five animals, only nine and a half months old, gave a total live weight of 532 kilogrammes—(1170 lbs.), which would be an average of 160 kils. 400 grammes per head,—134 lbs.) The oldest lot, twenty-one months old, weighed only 457 kils., or 91 kils. 400 grammes per head—(200 lbs.). The two other lots, of six and a half months old, and ten and a half months old, weighed—the first 387 kils., the second 486 kils.; an average of 77 kils. 400 grammes—(170 lbs.), and 97 kils. 200 grammes—(213 lbs.) When it is considered that these weights were of animals fattened for display, and brought directly from England, it will be remarked that the figure named for the average weight of the breed is no exaggeration.

The meat is of first quality, and esteemed above that of the New Leicester and New Kent breeds, although, like the latter, it may quite often be surrounded by the thick layer of fat before spoken of. M. Nouvais has truly said, one of the qualities possessed in a remarkable degree by the Cotswold "is that of accommodating itself to all varieties of climate and nourishment;" and adds, "this breed prospers upon the poor soil of the hills of Gloucester, and thrives equally well upon the rich pasturage of Leicester and Buckinghamshire." While increasing the fattening propensity, the breed has preserved, with its vigorous and rustic nature, the faculty of accommodating itself, more readily than any other of the English breeds, to the varying circumstances of agriculture and climate."

It is stated by good authority that flocks of Cotswolds will often average nine pounds of unwashed wool, and that this is a fair standard, below which they ought not to fall. Many of the bucks imported from England reach from 300 to 400 pounds weight. John Snell's Sons, of Edmonton, Ontario, Canada, state that they have bred Cotswold bucks that, at



COTSWOLD SHEEP, "ROYAL WINNER," "DUKE OF FYFIELD," "LADY GILLETT."

Property of John Snell's Sons, Edmonton, Canada.



eighteen months old, have weighed over 300 lbs., and have recently exhibited nine ewes of this breed that averaged 313 pounds each. They have also sheared on an average of an entire flock, over ten pounds of clean washed wool per head; but these results have only been reached after years of experience in careful breeding and large expenditures in importations.

The following is the standard of excellence and scale of points that has been adopted for this breed:

#### STANDARD OF EXCELLENCE AND SCALE OF POINTS FOR COTSWOLD RAM.

|   |     |
|---|-----|
| Head not too fine, moderately small, and broad between the eyes and nostrils, but with a short, thick appearance, and in young animals well covered on crown with long lustrous wool,                                     | 8   |
| Face either white or slightly mixed with gray, or white dappled with brown,   | 4   |
| Nostrils wide and expanded. Nose dark,  | 1   |
| Eyes prominent, but mild looking,   | 2   |
| Ears broad, long, moderately thin, and covered with short hair,   | 4   |
| Collar full from breast and shoulders, tapering gradually all the way to where the neck and head join. The neck should be short, thick, and strong, indicating constitutional vigor, and free from coarse and loose skin, | 6   |
| Shoulders broad and full, and at the same time join so gradually to the collar forward and chine backward as not to leave the least hollow in either place,   | 8   |
| Fore-legs.—The mutton on the arm or fore thigh should come quite to the knee. Leg upright with heavy bone—being clear from superfluous skin, with wool to fetlock, and may be mixed with gray,                            | 4   |
| Breast broad and well forward, keeping the legs wide apart. Girth, or chest, full and deep,   | 10  |
| Fore-flank quite full, not showing hollow behind the shoulder,  | 5   |
| Back and loin broad, flat and straight, from which the ribs must spring with a fine circular arch,  | 12  |
| Belly straight on underline,  | 3   |
| Quarters long and full, with mutton quite down to the hock,   | 8   |
| Hock should stand neither in nor out,   | 2   |
| Twist, or junction inside the thighs, deep, wide, and full, which, with a broad breast, will keep the legs open and upright,  | 5   |
| Fleece.—The whole body should be covered with long lustrous wool,   | 18  |
| Total,  | 100 |

#### STANDARD OF EXCELLENCE AND SCALE OF POINTS FOR COTSWOLD EWES.

|  |     |
|--|-----|
| Head moderately fine, broad between the eyes and nostrils, but without a short, thick appearance, and well covered on crown with long lustrous wool,                                       | 8   |
| Face either white or slightly mixed with gray, or white dappled with brown,  | 4   |
| Nostrils wide and expanded. Nose dark,   | 1   |
| Eyes prominent, but mild looking,  | 2   |
| Ears broad, long, moderately thin, and covered with short hair,  | 4   |
| Collar full from breast and shoulders, tapering gradually all the way to where the neck and head join. The neck should be fine and graceful, and free from coarse and loose skin,          | 5   |
| Shoulders broad and full, and at the same time join so gradually to the collar forward and chine backward as not to leave the least hollow in either place,                                | 8   |
| Fore-legs.—The mutton on the arm or fore thigh should come quite to knee. Leg upright with heavy bone—being clear from superfluous skin, with wool to fetlock, and may be mixed with gray, | 4   |
| Breast broad and well forward, keeping the legs wide apart. Girth, or chest, full and deep,  | 10  |
| Fore-flank quite full, not showing hollow behind the shoulder,   | 4   |
| Back and loin broad, flat, and straight, from which the ribs must spring with a fine circular arch,  | 12  |
| Belly straight on underline,   | 5   |
| Quarters long and full, with mutton quite down to the hock,  | 8   |
| Hock should stand neither in nor out,  | 2   |
| Twist, or junction inside the thighs, deep, wide, and full, which, with a broad chest, will keep the legs open and upright,  | 5   |
| Fleece.—The whole body should be covered with long lustrous wool,  | 18  |
| Total,   | 100 |

Exceptions to the general rule are sometimes met, and a "black sheep" found in a Cotswold flock. Mr. Henry W. Rice of Bourbon County, Kentucky, raised quite a flock of pure-bred sheep from a black buck lamb, the progeny of a fine imported Cotswold ram and ewe of the same breed, both pure white, these black sheep possessing all the characteristics of the Cotswold breed except that of color. Mr. M. T. Hearne of Kentucky stated that he visited Mr. Rice and that he liked these black Cotswolds so well that he bought two ewes, and from them he has raised quite a flock, that are equal in every respect to the best white Cotswolds he has ever seen; one of them, a ram, having taken the first prize at Lexington, in 1860, over all others.

He continued to breed them during the war until 1864, when he sold out the entire flock, black and white, at from \$10 to \$15 a head; the black ones, during all the time that he owned them, selling for the most money. After the war, the negroes being liberated, the black sheep disappeared, as it was for the black wool they were so much sought, to make clothing for the negroes. This is only an additional instance of the fact so well known and recognized by all naturalists, that there will be occasional variations or "sports" in every department of nature, these being the exceptions rather than the general law.

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## LEICESTERS.

TO the noted English breeder, Mr. Bakewell of Dishley, in Leicestershire, belongs the credit of improving this breed, which was accomplished more than a century ago, he having commenced the experiment in 1755. So successfully were his experiments conducted that ultimately the rams of this celebrated flock commanded \$15,000 as hire for a single season. To this breed the other long-wooled varieties are largely indebted for their improved form and aptitude to fatten.

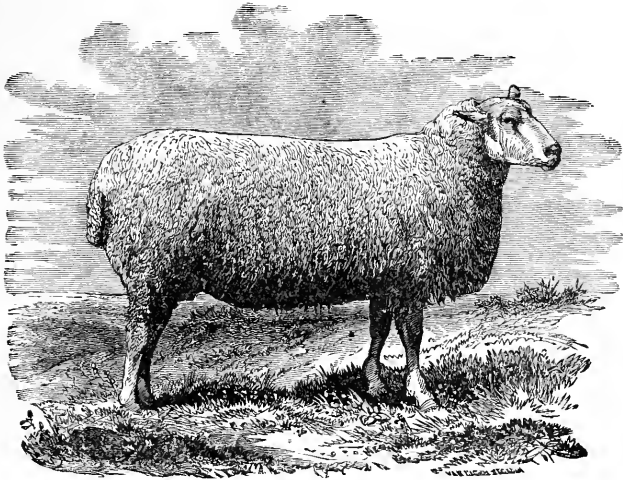
The original Leicester upon which Bakewell commenced his experiments is said to have been an animal of large frame, heavy bone, and coarse-grained meat, with a flat-sided body, and large, rough legs. It was also a slow feeder, and late in reaching maturity, weighing from 100 to 120 lbs. when two or three years old. With respect to Mr. Bakewell's experiments a recent writer says:

"Seeing the necessity of obtaining, in addition to the fleece, the largest possible increase of flesh in proportion to the food consumed, in the shortest period of time, he bred by selection most persistently and skillfully for these objects. With these aims always in view, he chose with rare judgment, yet with a broad latitude as to breed or family, such animals as would approximate his ideal of compactness and symmetry, refinement of bone, a reduction of the proportion of unprofitable parts, and higher capacity for rapid conversion of food to flesh. After securing this result by animals of characteristics so widely differing from those of the original stock, he found necessary a rigid adhesion to the practice of in-and-in breeding to keep the advantage gained, until a fixedness of type had been secured which should impress itself surely and indelibly upon any race which might be selected for improvement.

In accomplishing results of such practical value, with all possible care to retain the sound constitution and great hardiness of the old stock, there was perhaps inevitably induced a comparative delicacy, a reduction in size, a decrease in prolificacy and excellence as nurses. These defects have demanded the widest judgment in the infusion of fresh strains of blood, by which the stamina of the race has been fortified, and its popularity maintained until the present day, to such a degree that the Leicester blood is far more widely diffused than that of any other breed, even modifying essentially all the long-wooled races, and to some extent the mountain breeds, and some families of the short-wool Downs."

The most marked feature in their structure is the smallness of their heads and bones generally, in proportion to the size and weight of the body. Their mutton is however maintained in a due proportion of lean meat, and is not considered quite equal to the South-down and some other breeds. The fleece, on the average, weighs from six to eight pounds, the uniformity in the lustre of the wool making it quite popular with the manufacturers of alpacas, and other glossy-surfaced goods. It is not considered however quite as hardy as some breeds, although found in the climatic extremes of Canada and the cotton growing States. As a general rule the climate of the north is too severe for them, and a hardier race will be found more profitable to farmers of that portion of the country.

They are quite numerous in Virginia, Kentucky, and Tennessee, and some of the Middle and Ohio Valley States, but are not as numerous and popular in this country generally as the Cotswolds. The earliest record of this breed in the United States is a mention of them by Curtis, in writing of the Bakewell ewes on the estate of Washington, from which were derived the somewhat famous Arlington long-wooled sheep.



BORDER LEICESTER RAM,  
Owned by Lord Polworth, Berwickshire, Scotland.

The Leicesters are reputed to be less prolific than some breeds, twins being of rare occurrence in the flocks.

**Border Leicesters.**—This variety is considerably larger than the improved Leicester, which is supposed to be due to the introduction of Lincoln or Teeswater blood. They are similar in general characteristics to the Leicesters, the wool also being about the same value, but are recognized as a pure and distinct breed at Agricultural Shows in England, where prizes are offered. They are highly esteemed in the border counties, and south of Scotland. Mr. Wilson, Member of Council, Highland and Agricultural Society of Scotland, thus describes the breed:

“The most marked feature in their structure is the smallness of their heads and of their bones generally, as contrasted with their weight of carcass. They are clean in the jaws, with a full eye, thin ears, and placid countenance. Their backs are straight, broad, and flat;

the ribs arched, the belly carried very light, so that they present nearly as straight a line below as above; the chest is wide, the skin very mellow, and covered with a beautiful fleece of long, soft wool, which weighs, on the average, from six to seven pounds. On good soils, and under careful treatment, these sheep are currently brought to weigh from eighteen to twenty pounds a quarter at fourteen months old, at which age they are now generally slaughtered. At this age their flesh is tender and juicy, but when carried on until they are older and heavier, fat accumulates so unduly in proportion to the lean meat as to detract from its palatableness and market value."

## LINCOLNS.

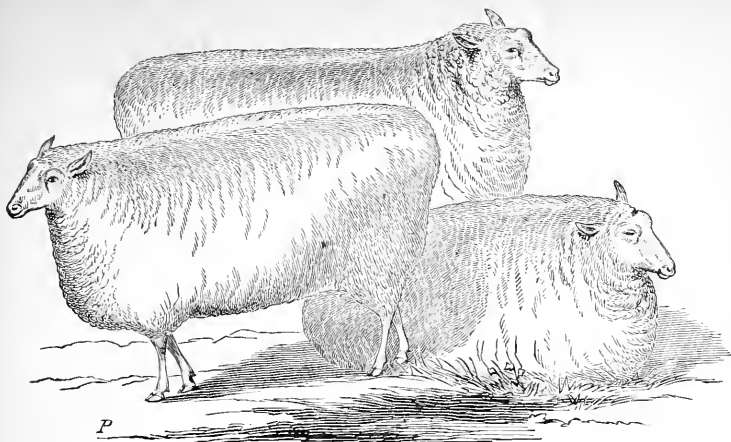
**T**HIS breed was originally from Lewes, Lincolnshire, England, and was formerly characterized by very large size, coarse and ungainly forms, with an immense fleece of very long wool, it often weighing from ten to twelve pounds. It has, however, been greatly changed for the better by crossing with the Leicesters, and is now, in fact, a sub-variety of that breed, the wool retaining mostly its original characteristics, which are length of staple, and a peculiar lustre which adds much to its value. They do not mature as early as the Leicesters, but are considered a valuable breed. The mutton contains less fat and a greater proportion of lean flesh than the Leicesters.

Mr. Richard Gibson, of Ilderton, Ontario, Canada, who has had many years' experience in breeding this variety, says:

"Lincolns have always been noted for producing the heaviest fleeces of combing wool of the very finest quality, but at the same time were a large, coarse, slow-maturing sheep, requiring rich pastures and from three to four years to fully develop, but were then monsters in size. But within the past seventy-five years there has been a great improvement in all varieties of sheep, but with none of the long-wool varieties perhaps as much during the last thirty years as with the Lincolns, and no variety of long-wooled sheep in England has made more rapid strides, in the general estimation of the tenant farmer, or extended their territory farther. They are now to be found in nearly every portion of the globe, and especially in the colonies of Australia and New Zealand are they in favor, no cross answering as well on the common flocks of the country.

When we consider the great advance that has taken place in all branches of agriculture of late years, and the prominent position that sheep have occupied in the general economy of Lincolnshire farming, we can readily understand the incentive and, in fact, the necessity of improvement in the sheep which might be called indigenous to that part of England. As the general aspect of the country changed, and what was formerly barren wastes and rabbit warrens gradually became one of the most productive and best cultivated portions of Britain, and as this great change has been due to the cultivation of green crops, and feeding them off by sheep, we can readily see that the old Lincoln, requiring three years to mature, was not suitable for the purpose.

There can be no doubt but that to the Leicesters, in a great measure, must be given the credit of having been instrumental in remodeling a variety that now beat their improvers in all points of practical value. We find that ninety years ago Mr. Dudding, of Panton (grandfather of the present eminent breeder of that name), was one of four Lincolnshire farmers to pay the Bakewell Club one thousand guineas (\$5,000) for the use of a ram one season. It is also recorded of another Lincolnshire farmer paying Mr. Bakewell one thousand guineas for the hire of two rams one year.



**LINCOLN EWES.**

Property of Richard Gibson, Ilderton, Ontario, Canada.



**LINCOLN RAM, "LORD CHANCELLOR."**

(Two years old.) Imported by and the property of Richard Gibson, Ilderton, Ontario, Canada.



But it is not to the cross alone that we must give all the credit, or by this time there would have been no Lincolns, as they would have merged into Leicesters; but the greater credit is due those breeders who had the sagacity to use the cross in such a manner as to retain all the good qualities of the old Lincoln, and only absorb or make use of such as were desirable for their purpose from the Leicester, without destroying the original type and introducing certain traits which would have been of no use, but certainly detrimental. It may be stated that one of the main objects to be kept steadily in view by these improvers was to establish a breed having the fine-feeding and early-maturing propensity of the Leicester, so as to suit the wants of the 'wold' and 'heath' farmers, who, owing to the nature of their occupancy, must have sheep to 'go off' at about twelve or fourteen months old, and at the same time retain the strong constitution and vigor of the old Lincoln, so as to suit the purposes of the marsh and fen farmers. To these must be added the adaptability of being kept in large flocks, and quickly maturing under ordinary farm management; lastly, to retain their powers of growing heavy fleeces of fine-lustred wool. As to early maturity, at the Smithfield Club Fat Cattle Show the Lincolns are the heaviest sheep exhibited. In 1870 the prize pen of three wethers about twenty-two months old averaged 328 lbs. each; the next heaviest were Cotswolds, 307 lbs. each. In 1871 the pen of Lincoln wethers not only took first in their class, but also the £20 cup for best pen of long-wooled sheep, and the £50 champion plate as best of any age or breed in the show, weighing twenty-three pounds per head more than the first-prize Cotswolds. Mr. Byron's prize pen of ewes averaged 346 lbs. each. In 1872 the Lincolns again won first prize for best pen of wethers in long-wool classes, averaging 312 lbs. each; the first-prize Cotswold weighing 289 lbs. and Leicesters 236 lbs., while Mr. Pears' first-prize pen of ewes averaged 322 lbs. At the last Smithfield show the Lincoln ewes were the heaviest sheep exhibited. But a better proof of their early maturity may be seen at the Lincoln April Fair, where from 60,000 to 100,000 sheep are annually penned for sale on Friday, mostly 'hoggets,' as they are termed, from twelve to fourteen months old (a term applied to a sheep after it has passed its first year). They are brought there for sale by the heath and wold farmers, and sold in their wool. Many of them are purchased by the graziers in various parts of the country, but most are bought by the marsh and fen farmers, who, owing to the nature of their farms, cannot keep a breeding flock. We have known whole flocks of the 'hoggets' to clip eleven pounds washed wool, and average 100 lbs. dressed mutton.

Mr. Robert Smith, in his report of the Royal Show, at Marwick, describing the Lincolns, states that he has known fourteen months old lambs averaging 35 lbs. per quarter (140 lbs. dressed mutton), and a hundred together clipping 14 lbs. washed wool each.

Mr. T. Marshall reserved for use in his flock three shearling rams of his own breeding, which averaged 317 lbs. each, the heaviest weighing 334 lbs.

Again, Mr. Chas. Howard says: 'Mr. Dawson killed a three-shear sheep weighing 96½ lbs. per quarter (386 lbs. of mutton), a two-shear weighing 91 lbs., and a shearling 71 lbs. per quarter.'

Many more instances might be quoted of their early maturity, but these excessive weights are often secured regardless of expense, and merely as a matter of boasting. But such is not the case at Lincoln April Fair; the sheep there seen are all penned by farmers who have to pay their rents out of their flocks, and it is with them an actual matter of dollars and cents.

That they are a healthy, vigorous breed may be gathered from the fact that a portion of their native country (the marshes and fens) is very wet and low lying, having been reclaimed from the sea. Some portions of this reclaimed land are sixteen feet below the level of the sea, and yet these sheep are grazed here in immense numbers, and some of the finest specimens we have ever seen were on these wet soils. In a lecture on long-wooled

sheep, delivered before the Royal Agricultural College by Mr. J. Algernon Clarke, when speaking of Lincolns, he says:

'It is certain that neither Cotswolds or Leicesters, in cases where they have been tried, (in that district), have equaled the Lincoln in value of wool and mutton. together produced per acre, and no other breed can furnish such big and heavy-skinned "lamb hoggets" as are the grazier's attraction at Lincoln, Caistor, and Boston spring fairs.'

As to their adaptability of being kept in large flocks, the Messrs. Dudding keep a breeding flock of 800 ewes, and clip about 1,400 head. Numbers of other farmers can be named having from 600 to 1,000 ewes, which means a flock of from 1,500 to 2,500 head to be wintered. As to whether they have retained the power of growing heavy fleeces of lusted wool, the Farmer's Magazine states that the first prize three-shear exhibited at the Lincoln meeting of the R. A. S. E. girthed 5 ft. 8 in., and had cut in his three fleeces 51 $\frac{3}{4}$  lbs. of washed wool.

In a lecture delivered by Mr. Charles Howard at the Central Farmer's Club, he mentions a case of 327 Lincoln 'hoggets' producing 3,640 lbs., an average of over 11 lbs. washed wool.

Mr. J. A. Clarke also states two instances, one where 257 fleeces weighed 3,276 lbs., or an average of over 12 $\frac{1}{2}$  lbs. each; the other, where a clip of 2,829 fleeces averaged 11 lbs. each. Mr. Dudding writes 'Our flock numbers about 1,400, and the average clip is from ten to twelve pounds each; our ram "hogs" shear from 15 to 20 lbs. The two you saw at Spalding (with two years' growth of wool), we clipped to-day; the first one cut 33 lbs., and the other 40 lbs.; length of staple 30 inches.'

Mr. Marshall writes us: 'Our ram "hoggets" cut from 15 to 22 lbs., and I have had as much as 26 $\frac{1}{2}$  lbs. from one.'

Much more evidence to the same effect might be adduced, but the above is sufficient for the purpose.

The above is not written with the intention of glorifying one breed at the expense of another, and we do not wish to be understood as asserting that the Lincolns are adapted to all portions of our country, but there are certain districts where we firmly believe that they will pay a better percentage than any other variety. We would not advocate their displacing the small, active Merino in the far West, nor the Merino and 'Downs' in certain portions of our rough, mountainous Eastern States, but it may be laid down as a broad rule, wherever Short-horn cattle will grow to perfection, there you may keep the Lincoln to advantage; neither of them like to work over-hard for their living; but wherever they can get a good bite and satisfy their appetites without too much exertion, there will the Lincolns pay to keep as long as combing wool is in demand and mutton eaten. We prefer them to the Cotswolds because they will cut a heavier fleece of a more valuable grade of wool, and will stand rough treatment better; to the Leicester because they have better constitutions, are not liable to lose their wool on the belly, neck, and arms, produce a heavier fleece, and because they are a better mutton sheep, having more lean meat, and the fat not deposited in large masses on the outside of the carcass; and to either of them, as being better adapted to the ordinary wants of our farmers, since they will make a better return in the shape of wool and mutton combined, for the amount of food consumed, than any variety of long-wool sheep with which we are acquainted. And lastly, we believe they will make a better cross on the common sheep of the country than any other that can be used."

## CARAMAN OR FAT-TAILED SHEEP.

**T**HERE are many varieties of the fat or broad-tailed sheep, and among naturalists generally they form a group by themselves. They are found in Asia and Africa,—being abundant at the Cape of Good Hope,—also in some portions of Europe. The tail in some of these varieties weighs from fifteen to twenty pounds, but among some of the larger kinds has been known, when well fattened, to reach the enormous weight of seventy, eighty, and in rare cases, according to the best authority, even as high as one hundred and fifty pounds; this overgrown appendage often being of great inconvenience to the animal. The Syrian breeds have it less developed than most of the others. It consists of an oleaginous or fatty deposit, said to be of a consistence between fat and marrow, very palatable when the animal is young, being often used by the inhabitants of these countries as a substitute for butter.

This appendage is often so cumbersome that in order to relieve the animal from dragging or carrying it about, and at the same time protect from injury what is considered the most valuable part of the mutton, and a great delicacy, a rude cart or truck is often placed under it as shown in the following figure, and which causes them to present a most ludicrous appearance.



FAT-TAILED SHEEP WITH GO-CART.

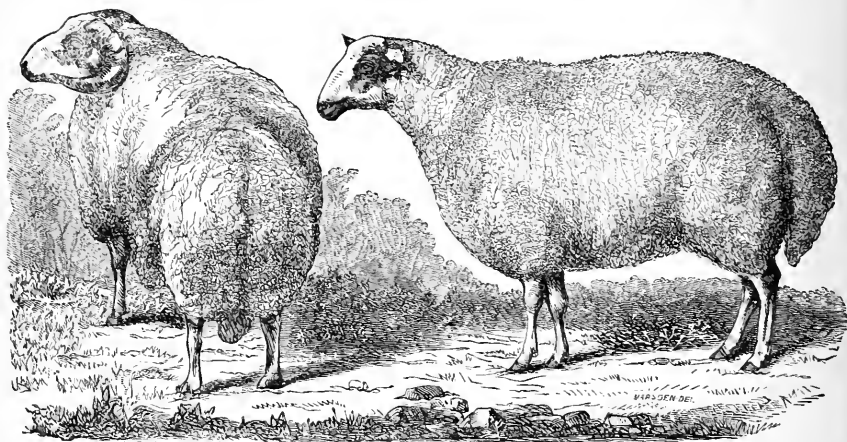
In the countries where these sheep are raised extensively, it is no uncommon sight to see them dragging about their little carts, with their much prized freight.

These sheep are rather small and their wool somewhat coarse in texture. They are supposed to be the varieties which were bred by the patriarchs and their descendants, the Jewish race. This inference is founded upon various passages in the Bible, among which are Exodus xxix. 22; Leviticus iii. 9; viii. 25;

where "the fat and the rump" are referred to in reference to offerings. Allen says respecting these varieties or families of sheep:—

"This breed consists of numerous sub-varieties, differing in all their characteristics of size, fleece, etc., with quite as many and marked shades of distinction as the modern European varieties. In Madagascar, they are covered with hair; in the south of Africa, with coarse wool; in the Levant, and along the Mediterranean, the wool is comparatively fine; and from that of the fat-rumped sheep of Thibet, the exquisite Cashmere shawls are manufactured. Both rams and ewes are sometimes bred with horns, and sometimes without, and they exhibit a great diversity of color. Some yield a carcass of scarcely thirty pounds, while others have weighed two hundred pounds, dressed. The tail or rump varies greatly, according to the purity and style of breeding; some are less than one-eighth, while others exceed one-third the entire dressed weight. The fat of the rump or tail is considered a great delicacy, and in hot climates resembles oil, and in colder, suet. The broad-tailed sheep were brought into this country about seventy years since, by Commodore Barron and Judge Peters, and bred with the native flocks. They were called the Tunisian Mountain sheep. Some of them were subsequently distributed by Colonel Pickering, of Massachusetts, among the farmers of Pennsylvania, and their mixed descendants were highly prized as prolific and good nursers, coming early to maturity, attaining large weight of superior quality of carcass, and yielding a heavy fleece of excellent wool. The lambs were dropped white, red, tawny, bluish, or black; but all excepting the black grew white as they approached maturity, retaining some spots of the original color on the cheeks and legs, and sometimes having the entire head tawny or black. The few which descended from those originally imported into this country became blended with American flocks, and are now scarcely known. A few other importations have since been made, but have proved of little value for American cultivation."

The accompanying representation was taken from specimens of this breed imported from Karamania, in Asiatic Turkey, by W. W. Chenery of Highland Stock Farm, Belmont, Massachusetts. It is stated on the best authority that the fat tailed sheep of the Kirghis, after being bred for a few generations in Russia, will lose this peculiar characteristic that had before distinguished them.



CARAMAN OR FAT-TAILED SHEEP.

Owned by W. W. Chenery of Belmont, Massachusetts.

**Dorsets.**—This is a very ancient breed of sheep found in the country of Dorset and vicinity, England. They are a hardy race, and resemble the Merino in general form, but in no other respect. They are particularly distinguished for being prolific, and are valuable for supplying early lambs for the market, as the lambs dropped in October are ready for table use at Christmas. This early breeding and prolific tendency are what have prevented the extinction of the breed, as they are otherwise not particularly valuable. They have even been known to produce lambs twice in the same year, and have long been used for supplying the London market. They are a white-faced horned sheep, with wool of medium quality, weighing about four pounds per fleece; are quite robust, and will subsist on scanty pasturage better than many breeds. Some varieties of the breed have a tinge of dun in the face and legs, but are usually pure white.

**Cheviots.**—This breed is found mostly in the hilly border counties between England and Scotland, and are a very hardy race. In general appearance they somewhat resemble the Border Leicester. The wool belongs to the middle class, and is used for the manufacture of goods commonly known as "tweeds." The best quality of this wool is said to be produced from dry, sweet herbage.

**Black-Faced, or Heath Breed.**—These sheep belong to the mountain breeds of England, and are found in the mountainous parts of Yorkshire, Lancashire, Cumberland, etc., and the Highlands of Scotland. Both rams and ewes have horns, those of the former being very large and spirally twisted. They have nothing of the russet or brown color that distinguishes the Down family, the face and legs being either black or specked with black, with an occasional tendency to this marking on the fleece. They are an extremely hardy race that could not well be dispensed with in their locality, or their place substituted by the more improved breeds, as they are capacitated to endure cold and hunger, getting a fair sub-

sistence on the rough mountain pasture, where the more delicately constituted improved breed would utterly fail. They will often pick up a scanty subsistence beneath the snows in the severe winter season. Their chief defects are in the quality of their wool, which is very coarse, and the slowness of fattening until their full growth is attained. Their wool is often mixed with kemps or hairs, which detracts from its value; it is also quite uneven and is used for carpets and coarse cloths, and weighs about three pounds per fleece.

**Cross Breeds and Grades.**—Some of the best breeds now extant have been obtained through judicious crossing, such as the Oxfords, for instance, produced by a cross between the Cotswold, Southdown, and Hampshire Down, besides various other valuable breeds that might be mentioned as the result of intelligent and painstaking effort in the improvement of stock of different kinds.

Experiments in this direction are often resorted to by farmers, when the results fail to be satisfactory, inasmuch as they may fail in selecting those individuals of their flock possessing the qualities adapted to the best results from a lack of knowledge and experience in the art of breeding, and also from expecting too marked results in a short time.

It must be remembered that some of the best efforts in establishing a breed possessing a fixed type, and the power of repeating or reproducing uniformly its most desirable characteristics, requires the labor of a series of years, or almost a lifetime of unremitting skill and perseverance, and with the main points to be reached and the well-defined object to be attained constantly in view. And when the establishing of a valuable breed has been accomplished, it must be kept pure and free from the intermingling of other blood, in order to be kept up to the highest standard of excellence. We are greatly indebted to the patient perseverance of skillful breeders of years past as well as the present, for the valuable breeds we now have.

Hon. John L. Hayes, Secretary of the National Association of Wool Manufacturers, says: "The breeding of animals is now recognized as among the greatest of the creative arts. Professor Agassiz says enthusiastically of the stock breeders of the present day: 'The practical realization of a theoretical acquisition has led them to make science the foundation of their business. From very empirical workmen they have raised themselves to be a class of thinking workers, who, as regards mental range, will very soon surpass every other industrial class, and before long will give society a totally new impress.'

No class of stock-growers have done so much to merit this high praise as the breeders of sheep. This species being so plastic in its character that the breeder, according to Lord Somerville's celebrated saying, 'may chalk out upon a wall a form perfect in itself, and then give it existence,' presents the most signal illustrations of the modern doctrine of evolution. The breeder has become a veritable creator. The products of his art have the permanency of primeval species. There are convincing reasons for believing that the precious Merino was converted by the art of man from the coarsest of the primeval sheep, the hair being dropped, and the underlying down, found still in the rudest of the ovine races, having been developed into fine wool. All the most valuable long-wooled races of England, so distinct in their characters, have been developed by human agency. The Merino of Spain has been converted on the one hand to the electoral race of Germany, and the sheep Naz of France; producing fleeces of the utmost fineness, but weighing not more than a pound and a half, and with a length of fibre of less than an inch; and, on the other, to the Rambouillet sheep, producing fleeces of thirty pounds weight, with a length of five inches.

New and unexpected qualities appear from time to time through accident, which the breeder turns to advantage, such as the silky Mauchamp wool, rivaling the Cashmere, or even modifications of the skeleton form of the animal, as in the Ancon or *otter* sheep of Rhode Island, with limbs so formed that it cannot jump fences. A new attribute attained by the

breeder's foresight, or his judicious application of happy accidents, may be of priceless value. Thence the immense money value of the best stock sheep—a value enhanced by the rapidity with which the regenerating influence of the male propagates itself. The influence of one buck in three or four years may raise the wool product of a flock of a thousand sheep from five to ten pounds for each individual.

There are cases which justify this statement. Thus, even in the time of the Emperor Tiberius, Spanish rams were sold for a talent—about a thousand dollars of our money. The ram-letting of two animals by Bakewell, the producer of the new Leicester sheep, produced in one season twelve hundred guineas. Our Mr. Hammond sold his bucks for five thousand dollars each; and even in Australia, where perfection in sheep-breeding might be supposed to be everywhere prevalent, a ram at a sheep auction in Melbourne, during the present year, 'after the keenest competition, was knocked down at three hundred and fifty-five guineas.'

In the history of agriculture no names stand so prominent as great benefactors as those of Robert Bakewell, the creator of the new Leicester; John Ellman and Jonas Mills, the improvers of the Southdowns; Von Thier and the Duke of Lecknowsky, in Germany, the improvers of the Merinos; Daubenton, the associate of Buffon, the founder of the French Merino; Mr. McArthur, the creator of the Australian sheep husbandry; Edwin Hammond, of Vermont, mainly the originator of the American Merino. The nobility of sheep-breeding is recognized in all the advanced nations. The Empress Eugenie took the flock of Rambouillet under her special protection. The Queen of England takes special pride in the choice flocks which adorn her parks. The English nobleman values the prizes for his perfected Southdowns or Lincolns above all the honors of the turf. And, at a dinner of the landed gentry, the topic of sheep and turnips takes precedence of all other table talk. Such recognitions lift the creative work of the sheep-breeder to the rank of the highest of the arts of agriculture, and make its acquisition not only a source of national emolument, but an object of national pride."

We believe that the thoroughbred stock is best, and that no cross-breeds will equal them, although for special purposes, such as the combining of the qualities of both breeds to a certain extent, whether it be mutton or wool qualities, very good results can often be obtained.

In changing the standard of a flock of sheep, by crossing or grading, marked results will often follow in a very short time, and a Merino, or even what are called 'scrub sheep,' can, by proper management and care, be changed into an almost pure-blooded Southdown, Cotswold, or any other breed.

The grades produced by improving in this way the common or native sheep are valuable, and this will be the best course for a farmer to pursue who has a native flock and does not possess the means of procuring the more valuable thoroughbred breeds. In such cases great care should be observed in procuring bucks of the very best quality, remembering that the general law of nature that "like begets like" is quite a reliable one, and although there may be exceptions, it is the safest to follow, and that the use of the best in this department, as well as almost every other, is the most profitable eventually.

A grade buck should never be used in a flock of thoroughbred ewes, as it will cause the flock to degenerate. Such is the inevitable result, and the progress of degeneracy will even be more rapid in such cases than that of improvement in a flock of common "scrub" sheep when thoroughbred bucks are used. Although in general appearance a grade buck may closely resemble the thoroughbred, and but little difference, if any, can be detected—and in fact lambs that are the product of grade ewes and thoroughbred bucks often show nearly if not quite as much quality as the thoroughbred rams, still they will not transmit this quality with any degree of certainty to their progeny; hence it is necessary that the *pure blood* be used for this purpose, whether the farmer's aim be wool, or mutton, or the combination of both.

The choice of breed for crossing or grading depends mainly upon the object desired. If fine-textured wool be the principal object, a Merino ram would be the breed recommended; if the demand be the longer-stapled wool of the combing variety, it would be a Cotswold, Leicester, or Lincoln, some of the Cotswold-Merino grades producing not only valuable wool in large quantity, but also very choice mutton, in this manner selecting the breed that combines the greater number of qualities desired for the purpose in view.

Mr. Joseph Harris, author of "Harris on the Pig," thus gives an account of his experience in crossing Merinos and Cotswolds:

"Starting with a flock of sixty common Michigan Merino ewes, and using a pure-bred Mapleshade ram, I got seventy-three lambs from the sixty ewes, and raised seventy-two of them. The ram lambs I sold to the butcher. The ewe lambs, at the proper age, were bred to a pure Cotswold ram, and the ewe lambs from this second cross, at the proper age, were bred to a pure Cotswold ram. The lambs so obtained have  $87\frac{1}{2}$  per cent. of Cotswold blood. The next, a fourth cross, of which I have only a few, contain  $93\frac{1}{4}$  per cent. of Cotswold blood. Four crosses is as far as I have gone, though I propose to continue this method of breeding, using in all cases a pure-bred Cotswold ram.

I am a breeder of pure Cotswolds, and am an enthusiastic advocate of them. But there are many who think that 'like produces like,' and they select accordingly. Said an experienced fine-wool sheep breeder, a few days since, in looking over my flock: 'If I wanted a ram, that is the one I would select,' and he pointed out one of the *Cotswold-Merinos*. 'I would rather have him than any two of your thoroughbreds.' The fact that this splendid grade ram was obtained by using a *thoroughbred* had no weight with him. I believe he is wrong. I believe we should always use good thoroughbred sires.

The *first-cross* sheep have fine, close fleeces, somewhat resembling Southdown, but finer. The wool is in great demand.

The *second cross* varies somewhat. Some of the lambs look exactly like pure-bred Cotswolds. All of them have wool long enough for combing, and all are remarkably vigorous, handsome, well-formed, healthy sheep. I showed a second-cross yearling ewe at the fair this year that was 'as pretty as a picture'—a strong, square, short-legged, full-bodied sheep, with long wool, a beautiful head, and handsome foretop—in fact, a model Cotswold in everything but pedigree. I have another *two-cross* ewe that I exhibited in 1877. She sheared 13 lbs., and weighed, in breeding condition, at two years old, 237 lbs.

The *three-cross* lambs are, in everything but pedigree, Cotswolds. If I was going to exhibit at a fair a pen of the three best lambs, or two-year-olds, without regard to the breed or breeding, I should select from these grades two or three cross lambs or sheep.

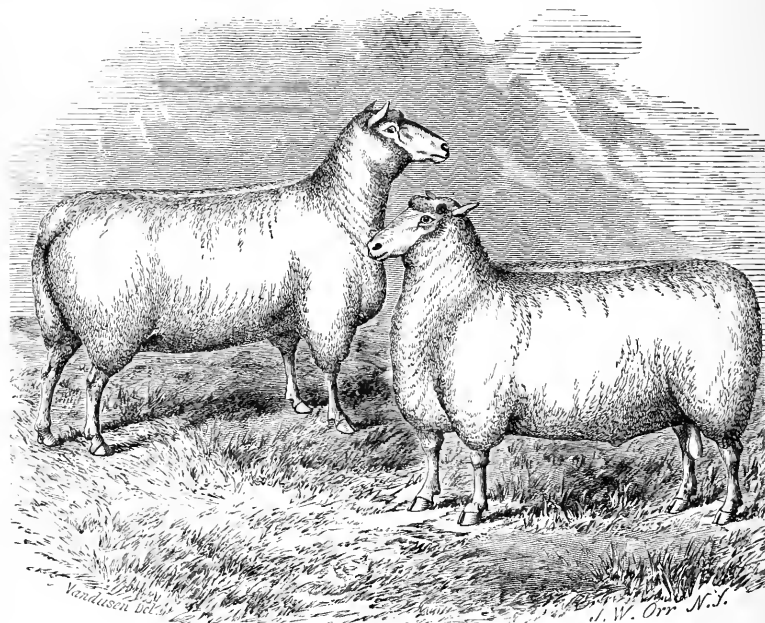
One word in regard to lambing. Many farmers seem to fear that if they put a large Cotswold ram to a small Merino ewe there will be trouble at lambing time. So far as my experience goes, their fears are groundless. We have never had the slightest trouble. A well-bred Cotswold has a small head, and it is the size of the head, and not the weight of the lamb, that causes trouble in lambing. We frequently have had lambs from common Merino ewes weighing 12 lbs. at birth, and in some instances 14 lbs.—and this from ewes weighing not over 80 lbs.—and yet we have *never* had any trouble in lambing.

The real secret of success in raising Cotswold-Merino lambs is to feed the Merino ewes a little better than common during the winter, and after lambing to feed them *as well as you know how*. A small Merino ewe cannot produce a 14-lb. lamb and give it all the milk it requires till it weighs 75 lbs., unless she has something to eat."

Mr. Killebrew, of Tennessee, says respecting grading a flock of common sheep:

"There are other considerations, important to the breeder just beginning to grade up his flock, in addition to their mutton qualities, even if mutton is his principal object. He wants long-lived and healthy ewes, and he wants them to yield him as much wool each year as

possible without detracting from their value as mutton. Remember, we are speaking of a grade flock now, with no thoroughbreds except the rams that are used. No better cross can be first used on the common ewes, it matters not what quality is most desired, than a Merino ram. It will add from one to two pounds of wool to each lamb, and will give a healthy and thrifty flock of half-breed ewes to breed from. With these to start on, it is an easy and pleasant task to shape the flock as desired. If a longer staple, a heavier fleece, and a larger carcass are desired, then a Cotswold ram should be used until the desired standard is reached; if, on the other hand, mutton is the object, use a Southdown ram on the half-breed Merino ewes. Either of these objects, wool or mutton, can be bred on a flock quicker by using direct on the scrub ewes a ram of either of the breeds mentioned, but in doing this we would get the hardy



IMPROVED KENTUCKY SHEEP.

Bred by Col. Robert W. Scott, Frankfort, Ky.

and valuable blood of the Merino, a cross that would certainly be of benefit to every grade flock. A most valuable and desirable grade sheep, and one that comes probably nearer than any other filling all the requirements of the average farmer, is to breed the half-bred Merino ewes in, twice to a Cotswold ram, and then on the ewes from these crosses breed a Southdown ram. In the first cross with the Merino we get more fleece of finer quality, a long-lived, healthy sheep. Such ewes, bred to a Cotswold, will nearly double the weight of fleece, giving it more length, and at the same time increasing greatly the size of carcass. Breed these Cotswold-Merino ewes to a Cotswold ram again, and the produce will approach very near a full-blood Cotswold in size and appearance. The fleece will not be quite as long or heavy as the Cotswold, but it

will be of finer texture, owing to the Merino cross. The ewes can be counted as valuable breeders at seven or eight years of age, and will, in their prime, average a clip of eight pounds of wool. The breeder can keep his flock up to this standard by using every third year a Merino ram on the ewes. The sale of early lambs, however, will be the chief source of revenue to him, and, in order to realize the best prices, a Southdown ram should be used for the sire of the market lambs.

The effect of breeding a Southdown ram on these Cotswold-Merino ewes will be of no advantage to the fleece of the offspring; on the contrary, it will have a tendency to decrease the weight and length; but the change in this respect is scarcely perceptible, and the advantages arising from this cross for mutton more than compensate for the loss in wool. The lambs from the Southdown ram will be of more compact form, mature earlier, and take on fat more readily than the Cotswold-Merino lambs. Ninety per cent. of them will have the distinguishing marks of the Southdown, in brown faces and legs. This adds nothing to their real value as mutton, but it assists the breeder very materially in disposing of them at the highest market price. This will be more readily understood by those who have experience in selling lambs, and know the very decided preference butchers give lambs that show their Southdown origin in black or brown faces and legs. Aside from the advantages mentioned above, a grade flock bred in this way are, owing to the constant infusion of fresh blood necessary to keep up the proper standard of the flock, remarkably healthy and vigorous."

The Oxforddowns, though comparatively but recently introduced into this country, have been found very valuable in crossing with the common sheep, as they readily transmit their valuable qualities, rendering the fleece heavier and increasing the size of the carcass, besides rounding it out in the more desirable points.

Respecting the improvement of breeds, Col. Robert W. Scott says: "The sheep which are called 'native,' or 'common,' in the West, are a hardy and prolific variety; but they are deficient in size, in thrift, and in fleece. Though the general diffusion of them proves their adaptation to the circumstances in which they are placed, yet it is well known that the tendency which all animals have to adapt themselves to climate and subsistence may be materially modified and controlled by judicious crossing, and that the improvement made by these crosses becomes permanent, and thereby stamps distinct varieties of the same class of animals. Chiefly by these influences (crosses, climate, and subsistence) the Bakewell, Oxfordshire, Saxony, Cotswold, and other varieties of sheep have been produced; and their distinctive features, in congenial localities, are as indelible as those of the stocks from which they were produced. In the same manner, no doubt, still other varieties may be produced; nor does there appear to be any insuperable difficulty in blending, in the same animal, any number of valuable qualities which are not actually antagonistic to each other. These principles extend even to points of fancy merely. For example, some breeds of sheep are hornless, while others have two, three, and even four horns. The Syrian shepherd delights in a breed whose tails are so long and fat that wheels are required on which to draw them over the pastures; but we prefer sheep with short tails, and perhaps a breed might be produced as destitute of them as are dogs of some breeds.

There are other important considerations which make the frequent crossing of sheep desirable, if not indispensable. Dr. D. H. Dadd says: 'It is now a well-ascertained fact that health and vigor can only be perpetuated by not running too long on the same blood. The best variety of sheep I have ever known (putting fineness of fleece aside) was the mixed Bakewell and Southdown.' Sir Robert Smith, in his prize essay for the English Royal Agricultural Society, says: 'Having tried experiments in every possible way, I do not hesitate to express my opinion that, by proper and judicious crossing through several generations, a most valuable breed of sheep may be raised and established.'

The tendency of all improved breeds of all domestic animals to relapse to their original

*status*, when they are neglected or abused, is no proper discouragement to this course of improvement; for such a policy would condemn the adoption of all our best breeds of horses, cattle, sheep, and hogs; for all have been produced by careful and judicious crossing and selection, and all improvements in stock can be fully maintained only by a reasonable share of the same care and judgment by which the improvement was originally effected."

By studying the characteristics of the different popular breeds, and their adaptation to his own particular locality, and other requirements, such as the soil, quality of pasturage, climate, etc., whether wool or mutton, or both combined, be desired, the farmer can readily decide which are best adapted to his own use, either for grading the common native flocks, or for maintaining the more valuable thoroughbred standard.

**Which Breeds are Best?**—As to which breed among the many valuable ones is best in an abstract point of view, and can be unerringly recommended for all parts of our country for all general requirements, we are of the opinion that there is really no best breed. Some are best for certain localities and purposes, and some for others; each of the choice breeds is best in a general and special sense, in its appropriate locality and under appropriate management.

The more hardy and vigorous breeds are best adapted to extremes of climatic influences and the more scanty pasturage, while those more delicately constituted will thrive best and be found most profitable, in temperatures suited to their capacities; the mutton and wool qualities of the different breeds vary accordingly.

Each breeder will have his favorite among the different varieties, and will contend that his own is the one to be preferred above all others. In making a choice among the standard breeds, the farmer will be required to study the characteristics of each, taking into consideration the conditions and circumstances governing his own locality, his object in the enterprise, and be governed accordingly. The furnishing of early lambs for market purposes will be found an important item in profitable sheep-husbandry to those farmers who are so located as to have a ready and easy access to a city market.

**Breeding Sheep.**—With sheep, as with all other animals, the general principle of the prepotency of the thoroughbred male, and the uncertain and generally unprofitable results of the use of grades, is an important truism; therefore, in all efforts towards the improvement of a flock in breeding, the sire should be a thoroughbred animal. A thoroughbred male will be sure to impress his own valuable qualities upon his progeny; any slight deviation from this being the rare exception, rather than the rule, while a grade male will not do this with any certainty.

The important truths relative to the force of heredity, which every breeder of domestic animals cannot fail to have noticed in his experience, should impress the farmer and stock breeder with the importance of selecting the very best specimens of the kind from his flocks for their perpetuation; and not only this, but a pure-bred ram should always be used; those who, with a view to economy, sire their flocks with inferior animals, will be disappointed in the result; the best will prove the most profitable in the end, in not only supplying better mutton and wool, which will command the highest prices, but in bringing up the standard of the flock and supplying the farm with well-formed and more valuable animals, which will in their turn be better capacitated to perpetuate a superior type of their kind, with the consequent profits to the breeder. Improvement should be the aim with every breeder, and this cannot be effectually accomplished without the proper material to work upon. (SEE BREEDS AND PRINCIPLES OF BREEDING)

**Choice of Buck, etc.**—As we have previously stated, grades for sires will prove most unsatisfactory, and as the expense of a pure-bred ram is now so low as to come within the means of almost any farmer, there can really be no reasonable excuse for using grades,

which are objectionable for use even in the common, native flocks, and they should by no means ever be used on thoroughbred ewes, as it would be the surest means of deteriorating the flock. It is true that our ablest scientists and best and most practical agriculturists maintain that "a cross in the blood gives vigor to the stock," but it must be borne in mind that these crosses are recommended to be made with the greatest care, and with a pure-bred male, which, having been made, the continued use of a pure-bred animal upon this cross bred product is always advised, until the flock has been graded up so that it very nearly approaches one or the other of the original types, neither of which may be exactly suited to the wants of the breeder; if so, a fresh cross can again be resorted to until the desired qualities are obtained.

It is perhaps unnecessary to remark that the buck of any breed should not be used for stock purposes until at least eighteen or twenty months old, and if he has reached the age of two and a half years, so much the better; the most vigorous period being considered from three to six years of age.

He should be strong, healthy, and robust, with fine form and possessing all the desirable points typical of his breed, and should also be as nearly perfect of his kind as possible. Any carelessness or oversight with regard to the selection may make a vast difference with respect to results, as the main dependence of the average farmer for the improvement of his flocks is the ram, and the securing of an animal destined for so important a service as controlling this improvement of the entire flock, considerable liberality in expenditure, and care in selection, will prove the truest and best economy.

Having secured a choice animal, he should be used judiciously and his services turned to the best account, which cannot be successfully accomplished without proper management on the part of the breeder. The best results can be secured by separating from the flock such ewes as are ready for service, placing a limited number in a pen with the ram and removing them as soon as served. When this cannot be conveniently done, he should be turned with a limited number of ewes for a few hours each day, being confined by himself, out of sight and sound of them, the remainder of the time. In such a case a little dry paint or powdered red chalk mixed with oil rubbed upon the ram's breast will aid the farmer in drafting out such ewes as have been served. Liberal feeding two or three weeks before and during the coupling season will be found of great value to successful breeding.

By such judicious management a vigorous buck can serve twice or thrice the number and his powers be no more taxed than he otherwise would when running with a flock of from thirty-five to forty ewes. He should be kept in a stable at night during this season and well fed with grain. He should always be kept gentle by kind treatment and never allowed to be teased or annoyed in any manner, as valuable animals may become cross and vicious, and a source of annoyance on a farm; when they become so they will be found most profitable to be made mutton of as soon as possible.

**Selection of Ewes.**—The best of the ewes should always be selected, while the old or inferior ones should be yearly thinned out from the flocks for mutton. By selecting the best ewe lambs every year to be kept for breeding purposes, and using, when the proper time comes, a pure-blooded buck, a flock can, by such careful selection, soon be graded up, even from the coarse "scrub" sheep, to an astonishing improved variety. Although it is not as essential that the ewes should be pure-blooded as that the bucks should be, still the better and more improved the ewes, the better the progeny. No ewe should bring forth her first lamb younger than two years, and many breeders prefer, for some breeds, that the ewes be three years of age, as the lambs will then be larger, more vigorous and strong, and the development and constitutional vigor of the ewes not be as liable to be impaired.

As a general rule, ewes should not breed after they are eight years old, although many have fine lambs at even twelve or fourteen years, yet these are the exceptions, and the most profitable results are attained from ewes that are considerable younger.

**Care of Ewes during the period of Gestation.**—Liberal food for the ewes while carrying their lambs will greatly increase the vigor and size of their young, as well as improve them generally; besides, where an ewe is kept in good condition during the period of gestation, she will have a more liberal supply of milk for her lambs when dropped. Want of proper food will deteriorate any flock, since without a sufficient supply of nourishment no animal can reach a full development, and will soon be reduced to inferior size and quality. The farmer who thinks to economize by stinting his animals or feeding coarse, unpalatable food, at this season, or any other, makes a serious mistake, for whatever tends to degenerate his stock is money out of his purse, instead of in it; and no animal can successfully meet the demands that nature makes in reproducing its kind without the aid of proper food, and that too in sufficient quantity.

By not permitting the rams to run with the flock, the farmer can regulate the time of the appearance of his lambs as he chooses, whether he prefers them early or later. All domestic animals should be petted to a certain extent, and thus be kept tame. This can easily be done by always treating them kindly and accustoming them to be handled so that they will know no fear. Sheep that are wild and timid cannot be as profitable as those that are tame, other conditions being equal, as the labor of caring for a wild flock is much greater; besides, loss of lambs is often occasioned by the running and jumping of the ewes when frightened about the time of lambing. Sheep that are well fed and receive kind and gentle treatment will be tame and quiet.

As the time for the young lambs approaches, those ewes that are the most forward should be separated from the rest of the flock, and put in a clean, warm, dry place. A stable is generally preferred in cool climates: from four to eight being put in together. In this way they can be better cared for, and there will be less liability to trouble, than where a larger number are crowded together. They should have careful attention, and be seen by the keeper often, in order to give assistance, if necessary. But nature does her work best unassisted, and mechanical aid should not be rendered unless necessary, as any undue haste may involve greater danger than the delay. In many instances several hours may be required, the labor recurring at intervals.

The natural presentation of the lamb is with the nose between the fore feet; should the reverse happen, and the hind feet be first presented, as is sometimes the case, there will generally not be much difficulty; when the head is turned back or any other unnatural presentation, the lamb should be gently pushed back and a better position secured by turning. In all such cases of mechanical aid, the hand of the operator should be well oiled with fresh lard or olive oil, and the work done very gently, as rough, harsh, or careless treatment at such a time is not only cruel and inhuman, but would result in the loss of both ewe and lamb. Ewes that are well fed will be less liable to have trouble at such times,\*since they will be more strong and vigorous than those that receive but indifferent care.

When ewes have had severe and protracted labor, from wrong presentation, injury, malformation or death of foetus, where force has been necessary for relief, causing inflammation, carbolic acid will be found very serviceable in allaying inflammation thus caused, and will often save the animal. It should be procured in solution—and can be procured of any druggist. One part of carbolic acid in solution, to six parts of soft water, with the help of a large syringe, will remove the difficulty. The application should be to the injured parts, and before any inflammation takes place, if possible. If the difficulty be great, its application should be made two or three times a day. The ewe should be kept very quiet, with no noise or disturbance of any kind.

Ewes that are suckling lambs require a large quantity of food. For a few days after lambing they should be fed on roots and bran, which cools the system and promotes an increased secretion of milk; but after a week or more has passed, richer food may be given, and they

will then increase in flesh. Much depends on the condition of the dams; if the mother is fat, the lamb will be sure to be a fine one, other conditions being favorable.

**Wild Sheep of the Mountains.**—The following description by a recent writer, of the manner in which wild sheep are bred in the Sierra mountain ranges, is so replete with interest that we give it insertion:

"In the months of May and June, they bring forth their young, in the most solitary and inaccessible crags, far above the nestling rocks of the eagle. I have frequently come upon the beds of the ewes and lambs at an elevation of from twelve to thirteen thousand feet above sea level. These beds are simply oval-shaped hollows, pawed out among loose, disintegrating rock-chips and sand, upon some sunny spot commanding a good outlook, and partially sheltered from the winds that sweep those lofty peaks almost without intermission. Such is the cradle of the little mountaineer, aloft in the very sky; rocked in storms, curtained in clouds, sleeping in thin, icy air; but wrapped in his hairy coat, and nourished by a strong, warm mother, defended from the talons of the eagle and the teeth of the sly coyote, the bonnie lamb grows apace. He soon learns to nibble the tufted rock-grasses and leaves of the white spiraea; his horns begins to shoot, and before summer is done he is strong and agile, and goes forth with the flock, watched by the same divine love that tends the more helpless human lamb in its warm cradle by the fireside."

**Period of Gestation in Ewes.**—The period of gestation in ewes is about five months, varying from 145 to 161 days, being an average of about 153 days.

The result of observations taken by M. Tessier, extending to 912 ewes, was, that 140 lambed between the 146th and 150th days—mean time 148 days; 676 lambed between the 150th and the 154th days—mean time 152 days; 96 lambed between the 154th and the 161st days—mean time 157 days—giving an average mean of 152½ days.

**Management of Lambs.**—In a cold climate, the lambs that make their appearance early, especially if the flock be large, require considerable time and care in their management to prevent them from being chilled, but where the temperature is warmer little difficulty of this kind is experienced. However, even under the most unfavorable climate the lamb usually gets on well after the first three or four days; especially if the ewe owns it. The ewe will generally lap her lamb dry, and it will soon attempt to take its "refreshments" in a natural order; but if the mother refuse to lick him, according to the true instinct of most of the brute creation, he should be carefully wiped dry, a piece of old flannel being the best for this purpose. It is well to put him soon to the teat, first starting the milk for him. It often requires much patience to induce a lamb to take hold, but persistent effort will in time accomplish it.

If the weather be cold, the lambs should be attended to at once, as they will soon be chilled. The udder of the ewe should not be allowed to become swollen or caked; to prevent this, when there is a tendency in this direction, the ewe should be milked by hand. When there is a deficiency of milk, the lamb may be supplied from a new milch cow, or in part from the surplus of some other ewe, which can be made to suckle him if held at the time. The milk from a farrow cow will often kill a lamb unless it has a little water and molasses in it. Milk given a lamb should never be scalded, but slightly warmed.

**Disowning Lambs.**—Sometimes the ewe will not own her lamb, and the shepherd has considerable trouble in this respect. In such a case the lamb must be made dry as soon as possible, and the ewe must be held while he takes his first meal. After the dam has suckled the lamb in this way a few times, she will sometimes own him without any further trouble, especially if they are put in a pen by themselves. A dark pen is thought by many to be better than a light one in such a case.

Young lambs require food often, and should have it at least from six to eight times during twenty-four hours; a little at a time and often is best. Another method adopted by some breeders is to milk from her udder over the lamb, and about the tail, rubbing it on well, which often proves successful. Still another method is to give the ewe a little meal or salt, and while she is eating it put a little on the head and back of the lamb, and hold it to her for her to lick off. By licking the lamb in this way, she will often own it.

Sometimes it becomes convenient to substitute a foster-mother for a lamb, in which case the ewe may generally be made to own him by the above methods, or by rubbing the lamb with the skin of the dead lamb, if she has lost one. When a ewe continues to disown her lambs through two successive years, it is better to fat her for mutton than take the time and trouble of using her for breeding.

**Rearing a Lamb by Hand.**—When a lamb is reared by hand, which involves considerable trouble, it should be fed regularly about six or eight times during the twenty-four hours for a few days; some breeders say six times between sunrise and ten o'clock at night. After a week or so, a less number of times with larger quantities will suffice. The lamb should be fed milk from a cow that has recently had a calf, and may at first be fed with a spoon. It is a good plan to put the little finger in the mouth of the lamb when feeding it, which will teach it to suck the finger; and after a few times feeding in this way, will learn to suck the finger while the hand is put in a basin of milk, and very soon to drink from a basin without the finger. It requires judicious management to know just how much to feed such a lamb.

There will be danger of over-feeding or not feeding enough for the first few days. In order to make large, vigorous sheep, they should be well fed and cared for. Many valuable sheep have been raised by hand, but it involves considerable time and trouble; yet there is nothing prettier for a pet than a lamb, especially for children.

**Food for Ewes with Lambs.**—Sheep with young lambs depending upon them for nourishment, should have a good supply of food. Good pasturage is very essential, since a ewe cannot be expected to supply her own wants and manufacture food for another without sufficient material to manufacture it from. It is a good plan to give a few roots, also a little grain, to sheep that have not a sufficient supply of milk, or that have twins or triplets to care for.

**Resuscitating Chilled Lambs.**—When lambs are dropped in a cold place and become chilled and stiff, sometimes apparently dead, they can generally be revived by the following methods, which have been found very effectual to breeders of experience. The lamb should be taken at once into a warm room, and placed in a tub or some other suitable vessel containing warm water enough to cover the entire body, which, except the head, should lie an inch or two under water. The water should be about 90°, or as warm as could be borne by a person's feet—(as warm as could be borne by the hand might be a little too high a temperature, as some persons' hands, from use, can bear water quite hot).

With one hand hold the lamb's head out of the water, and with the other rub it all over briskly, especially on the legs. In about two minutes add more hot water, continue the rubbing and add water for at least ten minutes, or until it moves its legs, puts out its tongue, or shows other unmistakable signs of returning life. Then remove it from the water, rub dry, and you will be surprised to see it stand. When the lamb is taken out, hold it up gently, in a warm place, by the fore-legs and head, allowing the water to drain off; then wipe over gently to dry; wrap in old flannel, or other woolen, and put it in the basket in a warm place. It should be thoroughly dried before exposing it to the chilly air again. As soon as possible, without exposure to cold, put it with the mother and give it the teat.

If it should prove weak and unable to walk from long exposure, wrap in warm cloths

and lay in a warm place, rubbing occasionally and giving a few drops of whisky or brandy in a teaspoonful of new milk. Many persons, as soon as a chilled lamb is found, at once administer stimulants, whereas if they first try to equalize the circulation in the manner described, success will follow in nine cases out of ten.

The lamb restored to activity, the next thing is to make the ewe own it. The ewe distinguishes its own lamb by the smell, and the process of washing is liable to make the sheep disown her offspring, especially if the mother be young. Take a dish of meal or chopped stuff, give some to the ewe, and while she is eating rub a few handfuls into the wool of the lamb. Rub part of a handful of salt on the lamb's head and along the back, remove the meal from before the ewe, quietly place the lamb under her nose, and as soon as she has a taste or smell of the salt or meal upon the lamb, she will commence to lick it. Then you may go about your business, for when she has once licked the lamb no further trouble need be apprehended in regard to her owning it.

In the same way when a ewe drops twins, one may be transferred to one which has lost her lamb. During the owning process it is always best to confine the ewe in a small pen or tie her up for convenience in placing the lamb near her.

This process of resuscitating chilled lambs works well (especially in the hands of the farmer's wife or daughters), because the warm water will quickly and equally warm every part of the skin at the same time, thus equalizing the circulation quickly and effectually. The danger will be in thoughtlessly exposing the lamb to the cold before it is thoroughly dry.

If this does not fully revive him, a tablespoonful of milk from a new milch cow, with a half teaspoonful of brandy, gin, or whisky, given warm, will prove beneficial; but this should not be given until the hot bath has been tried and circulation restored, as it will then prove more effectual. Wrapping the lamb in old flannel and putting in a warm place, combined with rubbing the limbs and body occasionally with the hand or a flannel cloth, will often restore them. An old sheep-herder in the State of New York gives his method as follows:

"I found in my yard this morning a pair of twins nearly dead. I brought them into the house to a good fire; warmed a blanket and laid it on the floor, and opened the oven door so as to get all the heat I could on the lambs. I then took one egg for each lamb, and beat it well in a tin cup, and, having some hot water in a basin, I put the cup with the egg into the basin of hot water and stirred until warm, but was careful not to cook the egg. I then put my finger into the lamb's mouth every two or three minutes, and gave him two or three teaspoonfuls of the warm egg. In less than one hour the lambs were ready to go back to the yard, and, with a little aid, sucked the ewe. I never had it fail, and have tried it for twenty years."

**Docking Lambs.**—Though seemingly a cruel practice, docking is essential to the welfare and comfort of sheep, as otherwise the long tail becomes so filthy that it proves a great detriment to the flock. This should be preferred during the first few weeks, the younger the better, provided the lambs be strong and healthy. It may, however, be done at any age from three days to four months of age. It should not be done when the weather is very cold, or very hot, the two extremes being objectionable. If very cold, the stumps will not heal well, and if done in very warm weather, the flies will be troublesome.

Cool, dry weather is the best, and it should be done in the morning, before the lambs have heated their blood by exercising much.

The best manner of doing this is to use a broad, thin, sharp chisel. One person should hold the lamb, while another performs the docking. Laying the tail on a plank of wood, and the person holding the lamb draws or crowds the skin as close to the body as possible, while the operator places his chisel between the bone joints, about two inches from the body,

and strikes it off at a single blow. The skin being longer than the two-inch tail that itself slips over the cut portion, which will soon heal. Many farmers use a sharp knife in docking but the above method is much better. When the knife is used, the cutting should be from the under part of the tail upward instead of downward, as is often done.

To aid in healing the wound, and also prevent flies and maggots from troubling, it is the common practice to apply an ointment of lard and tar, in the proportion of four pounds of lard to one pound of tar. A little spirits of turpentine added to the above is thought by many to be good, also turpentine alone applied. Some also prefer fresh butter to lard in the composition of the above ointment. The lambs should not be exposed to the cold until well.

**Castrating Lambs.**—As with docking, this operation should be performed in cool, dry weather, and in the morning, if possible; also when the lambs are young, as the older they are the more painful and troublesome it will be; yet at the same time it should be urged that it be not done until the animal be sufficiently strong to endure it, for it is a painful operation, and one that will task his strength to endure. We know of no better directions for this process than those given by Allen as follows:

“After selecting enough of the choicest rams for stock getters, the castrating may be performed at any time between two and six weeks old, when the lamb is in good health. A cool day should be chosen, or if warm, it must be done early in the morning. The best method is for one person to hold the lamb firmly between his arms, about breast high as he stands, while another, with a sharp knife, cuts off the lower part of the scrotum. The testicles are then drawn out till the spermatic cord is reached, which is gently pulled out and cut with a sharp knife. It is sometimes done by simply opening the scrotum, when the testicles and spermatic cord are jerked out. This, however, is a severe and cruel way, and not so safe as the other. The wound should then be rinsed with cold water, after which apply lard.”

Neither do we believe in the cruel “jerking” process, and would not recommend it on any grounds whatever, the use of the knife being safer and better every way. It is a very delicate operation, and must be performed with care. The ointment recommended for use in docking is also to be recommended here, especially if the weather be warm. If the weather be cold, when this operation is performed, the lambs should be kept protected until they are perfectly well.

**Feeding Lambs.**—Whether designed for the farm or the butcher, lambs should always be well fed; this is important in order to produce good size, and form, besides vigor of constitution. Those that are to be raised on the farm should run with the dam until about four months old, and, besides the milk of the dam, should be supplied with an abundance of good rowen hay and fresh water; besides this, when about a month old they may commence eating a little bran, oatmeal, or corn-meal; oil meal is excellent; many shepherds also feed wheat and oats with good results, beginning with a half-ounce per day to each lamb. At first, but little of either the above-mentioned articles of food should be given, until they learn to eat it, afterwards the amount can be increased as the lambs increase in size. When three months old, fattening lambs will eat from a pint and a half to a quart of meal in addition to the milk of the dam.

The feeding can be very easily arranged, and with but light labor, by constructing in some part of the sheep-yard a small pen, with an opening large enough to admit the lambs, but not large enough for the ewes. Lambs designed for the market should be fed until they are taken by the butcher. When designed to take the place of the older sheep on the farm, they should be weaned when four months old.

One of the most noticeable effects of good feeding is seen in the quality of the wool. If the feeding has been irregular, the texture of the wool will be varied, and when twisted

into threads will break in places. If scanty, the wool will be harsh and lack moisture. In sheep and lambs well fed, the wool will be soft and oily to the touch, as well as of a uniform texture.

**Weaning Lambs.**—The time generally allowed for the lamb to run with the mother is about four months; if they do this longer, it is a detriment to the sheep to be obliged to furnish milk in such large quantities, and so long a time; besides the lambs are quite as well off to depend more upon other food. The first step to be taken is to separate the lambs and their dams as far as possible, so that they may not hear each other's bleating, the lambs in a stable and the sheep in their yard. The lambs should be better fed than previously to make up the loss of the milk; for it is a drawback on the growth of a lamb to be allowed to lose flesh at this period.

The ewes should have an opposite course of treatment; they should be fed with dry hay in order to check the milk secretion; or if turned into a pasture immediately, the pasturage for a week or more should be scanty for this reason. If allowed a large amount of juicy, nutritious food, there will be danger of distention of their udders by the amount of milk secreted, to the extent of causing inflammation or garget.

It will be well to have the sheep milked once a day for a week or so after the separation, to avoid all danger of this kind, as many valuable ewes have been spoiled for breeding purposes through neglect and carelessness in this respect. Some breeders of large experience separate the ewes and lambs for the day, and turn them together at night that they may in this manner relieve their distended udders; others turn the lambs in for an hour during the day.

Some such care should be taken, and the farmer who, as is often the practice, neglects to do this, does so to the detriment of his flock, and his consequent loss. Whenever the udder of the sheep becomes inflamed with danger of serious trouble, such as garget or abscess, a good remedy recommended by high authority, is to give a tablespoonful of Epsom salts with a teaspoonful of ginger (in powder), mixing the compound with water. For the two following days give morning and evening twenty grains of saltpetre.

This remedy is said to so increase the action of the kidneys and cause a consequent determination of blood to those organs, as to greatly relieve the udder. Dry hay should also be fed instead of grass, until the difficulty is over. As soon as the sheep are dried of their milk, they should be put in fine pasturage, and well kept. They should have an abundance in all seasons, with the single exception above mentioned. Both sheep and lambs should always have a good supply of fresh water to resort to whenever they wish. When the lambs are first separated from the sheep, many breeders put one or two old tame sheep in with them for company. They are inclined to bleat less after the dams when this is done; after two or three days' companionship with the old sheep in a yard or other enclosure, they are turned with them into nice pasturage, and will soon learn to follow them as their leaders.

A little extra food, such as oats or meal, should be given each lamb every day, which feed should be increased when the pasturage begins to fail in the autumn. Nature requires material for building up all the cells and tissues, and meeting the various demands that are made for the constantly increasing structure of the growing animal, and unless the material is furnished in the shape of food, the animal will be stunted in growth and imperfect in other respects, therefore we feel the constant necessity of urging upon farmers to *feed liberally*, with good, nutritious food.

**General Management of Sheep.**—In order to be profitable, sheep should have good care during all seasons of the year. They should be provided with good pasturage with plenty of shade and fresh water in summer, and in winter with warm, comfortable quarters, with a sufficient quantity of nutritious food suited to their wants. It is very important that they

have better care in the earlier part of winter than they are accustomed generally to receive from the average farmer; for without a fair start in going into their winter quarters, they are very apt to decline, as there is an extra demand for food and care during the winter, with a small return for it in wool in the spring, as no sheep that is not in a thriving condition can produce much wool, since the growth of wool always depends upon the condition and health of the animal. When sheep are healthy and kept fat, the wool grows rapidly, and large fleeces are the result; when kept poor, the fleeces will be correspondingly light. No flock can be expected to manufacture mutton or wool without the material to manufacture it from, and that material can be nothing else than the food taken into an animal's stomach.

Sheep should be brought into winter quarters very soon after the severe frosts have reduced or impaired the feed of the pastures, and they should have a little grain every day from the time the grass begins to fail until it is well started in the spring. A sheep breeder of large and successful experience says: "I would rather my sheep would have a gill of corn or oats per day from the middle of November till April, than a pint per day from January till June," thus showing the importance of starting them well in the early winter. A good supply of roots, such as turnips, is also very beneficial at this time. Sheep should not be crowded into too close quarters; the percentage of health is much greater in small flocks, than in large, there being much more danger of disease in large flocks than in small. Some recommend seventy-five or a hundred as a number suited to a single flock, while others are quite successful with from two hundred to three hundred; others still recommend from twelve to twenty as a more profitable number for a flock.

Much, of course, depends on the size of yards, etc., and the general accommodations for large or small flocks, as good ventilation and sufficient room are very essential to the health of any animal; but where the conveniences are such that small flocks can be maintained separately, such a practice would be more desirable. Of course, this would not be practicable in sheep husbandry on the extensive ranches of this country, such as some of those in the Western States and Territories, where thousands of sheep are kept which require the constant attention of shepherds. Its application would be to the general breeder or farmer. The flock should be so divided that the stronger cannot injure the weaker, and in such a manner that all may have an equal chance. The lambs should be put by themselves with a few old sheep; this will have a tendency to keep them tame. The breeding ewes should also be kept by themselves, as well as the large and small wethers. A hospital pen should always be reserved for the sick or injured. Dividing as nearly as possible according to strength and condition, all will have a fairer chance for getting on well, than where large numbers of all ages and conditions are allowed to run together.

**Sheds for Sheep, etc.** — The yards should be dry and provided with sheds that can afford the sheep comfortable protection from all storms, and to which they can retire when they choose; it would be well to have the yard slope a little in order to better protect it from the accumulation of water. A shed well boarded on three sides and provided with a tight roof, is a sufficient protection for all except in storms or the most severe weather in winter. And if it open to the south, with a southern slope, into a well enclosed yard, so much the better. The addition of sliding-doors, to be closed in case of severe storms, will make a very comfortable winter establishment for any flock.

Arrangements should always be made for proper ventilation, and by that we mean that the animals should have an abundant supply of fresh air, without being exposed to a draft or current of air, which can readily be accomplished with a little ingenuity and forethought in the construction of such a shed. No animal suffers more by close confinement than a sheep, consequently they should be confined as little as possible, and should be allowed the freedom of the yard at all times except during the severest storms. Conditions of climate vary, but

we believe it more profitable for any stock raiser to provide shelter for the flocks, even in the hottest temperature in which sheep are found. Sheep well protected from storms require less food, thrive better, and are less liable to disease than those that do not receive such care.

Originally the coats of our domesticated sheep are believed to have been hair, with a sort of down underneath. The hair has no doubt been supplanted as the result of selection, care, and nourishment. How long since this was done it is impossible to tell, for the domestication of sheep dates back to a very early time. In some parts of the world there can be found hairy sheep now, and Mr. J. L. Hays expresses the opinion that the wool of any sheep will turn into hair if the animal is treated with neglect, exposed, or kept upon hard pasture. He says he has experimented, and that his experiments have resulted so as to convince him of that fact. It is said that hairy lambs are frequently born in the purest Merino flocks in the North of Germany, where the flocks are not always as refined as they might be.

General C. P. Mattocks, Portland, Maine, gives his method of sheep husbandry as follows: "I keep sixty breeding ewes, but in winter have only twelve or fourteen sheep in a flock. These little flocks through the winter each have a yard of one acre, and a small rough shed, ten feet square, open to the south, which remains entirely open at all times except during storms, when the sheep are driven inside and movable doors put up to keep out rain and snow. These sheds are hauled to the pastures in summer for shelter. The sheep are fed in racks, nailed to the fence of the inclosure, and covered with a board with a strap hinge to prevent the hay from blowing away. The grain, as well as the hay, is fed out of doors, except in storms, when the grain is fed inside, as also the hay, occasionally. This plan I do not recommend where the climate will allow the sheep to roam at will over the fields, but in Maine, while the ground is covered with snow so many months, one acre is as good as a dozen. By thus having six or seven flocks of but a dozen sheep each, I am able to sort my sheep in such a way that the stronger can not make continual war upon the weaker. Lambs should always be kept by themselves, as also the bucks.

In lambing time, of course warm quarters must be provided, but as an accurate record of the serving of each sheep is kept, the ewes nearest to lambing are constantly culled out and placed in the lambing yards, which connect with warm sheds and barns. A hospital should always be at hand for the reception of old or wounded sheep, as they require warm quarters and special feed and care, and as their feeble condition is injurious alike to the health and appearance of the flock as a whole. Sheep should not run with, or be fed with other stock in winter. If it is desirable to feed to them the waste of cattle and horses, let it be gathered together and fed to them, but never run the risk of their being injured by cattle and horses. I will here say that in summer I have no difficulty in keeping sixty sheep in one flock, indeed I have kept that number, and more, of Cotswolds together the entire year, with good results.

As most farmers have little but dry hay to feed in winter, they are apt to wonder what they can do to improve upon it. There is not one of them but could raise oats enough for a daily ration of a pint per head, and if the hay could give place once a day to cornstalks, oat straw, or pea straw, it would be much better than the present practice; and here let me say, that no corn fodder is equal to that of sweet corn, when properly cured. A full supply of salt must always be at hand, or else a weekly ration should be fed. Tar, for the sheep to lick at will, is excellent. Should the sheep begin to have a discharge at the nose, as is sometimes the case in bad weather, a solution consisting of one ounce carbolic acid salts, to a gallon of water, used once a week by turning a teaspoonful down each nostril, will soon remedy the evil, care being taken not to allow the sheep to swallow the mixture. Smearing the nose with tar is good in summer to prevent the deposit of eggs in the nostril, which may afterwards develop into the much dreaded "grub-in-the-head," and is also a good practice in

winter, by reason of its medicinal qualities as an antidote for colds and catarrhal troubles, and besides, the sheep soon acquire a taste for it, and derive from it much the same benefit they would from nibbling boughs, containing similar properties, in the forests. If grain is to be fed during winter, as it undoubtedly should be in the New England States, corn should be very sparingly used, while oats and peas can be safely and profitably fed in considerable quantities. Shorts may be fed to advantage. Cotton seed meal has been used to advantage by many of our best flock-masters. The breeding ewes should be taken from the flock two or three weeks before lambing, and fed upon roots, mixed with oatmeal or shorts.

The circumstances and purposes of each breeder must determine whether the lambs shall come early or late. If a farmer has no suitable convenience for early lambing, it is far better to let the lambs be dropped after the sheep are turned out to pasture in May. With warm lambing pens and good care, the lambs may come, even in New England, as early as February; and thus the lambs are ready for the grass when it starts in the spring. It is better when the spring comes, that the sheep should be turned into the pasture a few hours only, each day, lest a too sudden change induce the scours, which is such a scourge to sheep. The sheep should be thoroughly "tagged," by which term is meant the cutting away of the wool under the tail down to, and around, the udder, so that the lambs may not be impeded in sucking, and to prevent the accumulation of filth, which would otherwise seriously impede the movements of the animal.

In the summer the sheep should be changed from one pasture to another, as often as possible. If the farmer has but one pasture, let him run a fence through the middle, and thus become the owner of two pastures, so that his flock may have the necessary change.

With a few simple precautions in the matter of food, and such details as would naturally suggest themselves to a man of ordinary prudence, there is no reason why our thoroughbred flocks should not be as healthy as any others. It is true that ambitious exhibitors have often sacrificed their best animals to a forcing system which may be productive of good results in the show-pen, but can never fail to do great injury to scientific breeding. The fact that so many high-bred rams suddenly drop dead from no apparent cause, could in most instances be explained by an examination of the liver, which would be found to be diseased, simply from over-feeding and want of exercise."

**Racks for Feeding, Fences, etc.**—Where hay is fed to sheep upon the ground, much of that which is valuable is lost by being trodden into the earth; therefore it is essential to economy as well as the welfare of the flock, that suitable racks or mangers be provided for feeding purposes. The transition from winter or dry feed, to pasturage, is a critical period and liable to be attended with evil consequences, unless it be made so gradual as to avoid any shock to the animal system. If the grain supply be gradually diminished in quantity so as to be kept up until the grass becomes long enough to furnish sufficient sustenance, the evil consequences of the change will be obviated.

In tagging, as well as shearing sheep, great care should be taken not to cut the skin, as any wound would be liable to draw flies which will at once deposit their eggs in it. Should such an accident occur, it should at once be covered with a mixture of tar, lard, and turpentine, as recommended for use in docking or castrating lambs. Sheep husbandry is attended with much less expense in the South and Southwest, than at the North, where much of the food for the flocks must of necessity be stored for winter use when the ground is covered with snow.

Good fences are requisite where sheep are to be confined to a pasture, and as they are notorious jumpers, a pasture may as well have no fence at all as a poor one, since the entire flock will be liable to follow one bad example of this kind. Good fences will save the farmer much annoyance and expense, besides the satisfaction of always knowing where to find his flock. They should be constantly watched, for straying sheep will be liable to soon become

lost, and when the habit of changing their quarters in this manner is once established, it is the source of great trouble and annoyance to the owner. The sanitary condition of the flock should receive constant attention, and should any become diseased they should at once be separated from the others, and kept by themselves until entirely well. Contagion can in this way be avoided. A lack of oversight in this respect is sometimes the loss or damage of nearly an entire flock. Sheep should never be kept in marshy, wet lands; no stock can be kept healthy in such localities. They will subsist on poor pasturage, but it must be on dry soil to be favorable to the health of the animals.

**Sheep Folds.**—In some sections it is customary to put sheep in a fold every night as a precaution against the depredations of dogs, or other animals; in newly settled localities they are very essential as a means of protection against wolves and other wild animals. A fold can be made to last a number of years at slight expense and labor. Commissioner J. B. Killebrew, of Tennessee, has described, in his treatise on "Sheep Husbandry," the manner of constructing a sheep-fold, as follows:

"Select a suitable spot near the dwelling as may be. Let it slope so that it will not become muddy or sloppy. Let it be in size to suit the number of sheep intended to protect. An acre of ground will suffice amply for from one to five hundred sheep. Let it be enclosed by any means that will exclude a dog. One used for years by the writer was made of pickets, cut eight feet long and put two feet in the ground, well packing and stripping it on the inside. It is not necessary to sharpen the ends, as, if closely put together, it will never be passed by dogs. Have an entrance by a door, so that when shut the fold is closed. If pickets are not convenient, a plank fence will answer equally well, only it will require more constant care to keep it in repair. About 1,700 pickets are required to make a fold, worth, when of cedar, \$3 per hundred. It will cost seven cents a yard to dig the trench and put them up. The strips, four inches wide and one inch thick, will cost \$1.50 per hundred feet, and the nails will cost about two dollars more. So a good substantial fold made of cedar, which will last, with slight repairs, at least twenty-five years, will cost say \$75, which is a very small sum to pay for security and peaceful nights.

If one wishes to economize, he can either enclose his barn with such a fence, or some other of his outbuildings that require an enclosure, and thus save a double expense. Thus, while his neighbors are continually annoyed by dogs, and sustaining heavy losses with destroyed or harrassed sheep, he can turn the key on his flock and quietly go to bed, satisfied his flock will be safely in the fold next morning.

The fold should be also sheltered on the inner side, to allow the sheep to feed during the long nights and be protected from the rain, as well as have good dry hay to go to. The shelter should be not more than four feet high, and the length of two boards will be sufficient. Next the fence racks can be constructed in the following manner: A round pole from the woods or a heavy scantling is laid against the bottom of the pickets, and secured there by stubs driven in the ground. Then bore one and a half inch holes in an oblique direction, so that slats or rounds driven in the holes will have a slant of about forty-five degrees from the fence. Then fit on the other ends of the rounds a companion scantling, about four feet from the ground pole. This scantling will then serve as a support for the roof, letting one board extend from the scantling to the fence, and another outwards, with the outer ends resting on a plate two inches square, which is itself supported by stakes, at intervals of six or seven feet, firmly driven into the ground.

At intervals of eight or ten feet place some two or three boards nailed together, but movable, so they can be raised to put the hay in the rack. Then nail two planks, seven or eight inches wide, together by the edges so as to form a V-shaped trough, supporting or bracing it by nailing strips across at intervals of twelve inches, which will serve not only as a brace, but also prevent the sheep from throwing their food out. Nail this trough firmly to

the ground pole of the rack, and there is a barn far better than the most expensive covering ever built by the amateur farmer. It protects them from rain and snow, and keeps their food dry, and prevents it from becoming worthless from tramping and defiling. Should the flock become so large that all cannot eat at the same time, supplementary racks and shelters could be erected by building a fence or plank wall four feet high, and sheltering and racking both sides as their necessities may require.

Nor does the advantage of the fold stop with the security of the sheep. It is said the foot of a sheep is golden. During the day he distributes his rich manure over the pastures in an admirable manner, carrying it where most needed on the slopes and thin soils of the higher lands. By proper attention to raking, saving, and sheltering, here can be gathered and garnered a rich store of plant food. And it is truly astonishing what a large amount of valuable manure can be collected in a short time. The litter, such as straw or leaves, that has been or should be spread under all the sheds, will become saturated with the urine, and this, thrown on the general heap, generates an immense amount of ammonia, which, lodging in the mass of decaying vegetable matter, makes a manure unexcelled by any."

**Food for Sheep.**—In England sheep are not given the run of the entire pasture as in America, but are confined to certain limits by means of movable fences or hurdles, and thus are given a portion of fresh ground each day, in addition to that of the preceding day or two. This, of course, necessitates considerable trouble in constantly moving the fence, but English farmers seem to consider this a profitable practice or they would not continue it. Then, there is no waste; and a fresh supply of herbage is given the flock each day. In spring the crop is winter rye, or rye and vetches. Later follows the clover and early turnips, hay being always fed twice per day when turnips are given. Swedish turnips are the roots that are usually most fed there during the winter. Although the English practice of hurdling flocks might not be considered profitable to the American farmer generally, where there is no lack of land, and the farms in most portions are generally large, still we think it would be far better for our flocks if a fresh field could be given them more frequently, even though it might not be large, and the objection of constantly feeding over the same ground avoided. This could be accomplished at slight labor and expense by dividing the pastures into two or three sections and feeding them alternately; this practice would be better both for the lambs and sheep, preventing too close cropping of the herbage, and providing better food for the flock.

Frequent change is necessary in order to keep the sheep contented, and unless it be given them, they will become restless and jump out and seek fresh pasturage; therefore it is better to give them a change as soon as they become uneasy. In order to do this, it is well to divide the field by fencing, or if on an extensive range or ranch they should be driven to another section.

Good hay, composed of clover and the cultivated grasses, is among the best of sheep food. Beans are especially adapted to sheep, of which they are very fond, being nutritious, as well as valuable in the promotion of wool growth. Bean and pea straw, in fact all kinds of straw, can be utilized by them also with profit, but it should always be cut and mixed with bran, meal, or other kinds of food. Roots are especially adapted to them, and should be given, for a time, at least, when making the sudden change from fresh grass to dry hay in coming into their winter quarters, the juices of the roots making up in a measure the loss of moisture in the green herbage. Some flock-masters consider this change the most critical period during the entire year, as the sudden change of food is liable to induce disease, and anything that will have a tendency to modify this sudden change of diet should be given if practicable. Turnips should also be fed to ewes a few weeks before and after dropping their lambs, to increase the milk production. Much grain is regarded by many injurious, especially large quantities of corn, as it is considered too heating when given in large quanti-



HAMPSHIRE RAM.



ties without other food; it is also one of the best fattening articles of food that we have. When mixed with oats and bran the injurious heating effect is largely obviated. Corn meal can be fed without injury in larger quantities than corn, and is very good for young lambs, or old and feeble sheep. Oats and wheat have been found by experiment to be excellent in keeping a flock in a good and thrifty condition. Breeding ewes are greatly benefited by being fed considerable bran, as it contains the essential elements of bone and tissue formation; but breeding ewes that are thin in flesh will put on fat by giving them for a time all the corn they can bear; however, there is danger of overfeeding, and this may be avoided by mixing bran or oats with corn, and by having at least a part of the corn ground.

Oats, as well as turnips, induce an increased flow of milk, and assist in keeping up the condition of the dam. Oil-meal is very nutritious and aids in putting on flesh; it is valuable to feed with bran or oats. The age and condition of sheep must be taken into account before determining the quantity or quality of food to be fed, whether the object be for fattening for the market, or for improving the general condition of the animal. Young sheep require a different composition in food to change them from a lean condition to a thrifty one. The same amount of food will put more flesh upon yearlings than those sheep that are three or four years old. The young animal requires food richer in albuminoids and phosphate of lime, or such elements that go towards the formation of bone and muscle.

One-half pound of linseed meal or cotton-seed meal, mixed with one and a half pounds of corn, is thought by many to be a valuable combination when given in the quantity of two pounds per head per day in connection with any kind of hay, which makes a full ration for most sheep in fattening. Whatever the food given to sheep, regularity should be observed in respect to time, giving as nearly as possible at stated regular hours each day. If fed in this manner, they will soon learn to know when the time for feeding comes, and will eat and be quiet until the time for feeding again; but if fed at irregular times, they will be uneasy and restless, and consequently will not thrive as well. Regularity in quantity as well as in time of feeding is also essential, since it will largely influence the evenness of the wool fibre. If full feeding is followed by a scanty allowance, or the reverse, the fibre of the wool is correspondingly affected, the generous diet enlarging the wool fibre, and the limiting of the quantity of food contracting it, producing an unevenness in the wool that is very injurious to its quality, and consequently deteriorates its value.

The following results of the experiments in feeding sheep, furnished by Dr. Lawes, of Rothamsted, England, and which were performed by himself at his noted Experimental Station, will doubtless be both interesting and profitable to the farmers and stock-breeders of America.

In the following table are shown the average weekly consumption of food, and increase of each animal, throughout an entire period of nineteen weeks:—

TABLE  
Showing the Average Weekly Consumption of Food per Sheep, and the Average Weekly Increase of each Animal in pounds and ounces.

| Pen Nos. | Average Pounds Weight of Sheep at commencement. | Description and Quantity of Food per Sheep per Week.                                  | Sheep Numbers. |       |      |       |      | Average Weekly Increase per Sheep in each pen during the entire period of the experiment. | Average Weekly Increase per Sheep in each pen during the first 11 weeks of the experiment. |
|----------|---|---|----------------|-------|------|-------|------|---|--|
|          |   |   | 1              | 2     | 3    | 4     | 5    |   |  |
| 1        | 121½  | <div> <div>lbs. oz.</div> <div>Oil Cake 7 0</div> <div>Clover Chaff 22 2</div> </div> | 1 6½           | 1 11½ | 1 11 | 1 9½  | 1 9½ | 1 9½  | 1 15½  |
| 2        | 121½  | <div> <div>lbs. oz.</div> <div>Linseed 7 0</div> <div>Clover Chaff 20 0</div> </div>  | 0 13½          | 1 3½  | 2 5  | 1 7½  | 1 11 | 1 8   | 1 11½  |
| 3        | 120½  | <div> <div>lbs. oz.</div> <div>Barley 7 0</div> <div>Clover Chaff 20 14</div> </div>  | 1 7½           | 0 14½ | 1 8½ | 1 14½ | 1 8½ | 1 7½  | 1 14   |
| 4        | 120½  | <div> <div>lbs. oz.</div> <div>Malt 6 9</div> <div>Clover Chaff 20 12</div> </div>    | 1 3½           | 1 2½  | 1 1½ | 1 4½  | 1 10 | 1 4½  | 1 13   |

It will be seen by the above table, that the number of sheep experimented upon in this case was twenty, and that they were put in four separate pens of five sheep each; the sheep being as nearly alike in condition, weight, age, etc., as possible, which is the only proper principle upon which a just estimate of any such experiment can be made.

TABLE

Showing the Mean Weekly Increase of Thirty Sheep, fed upon Green Clover, and 1 lb. each of Oilcake, during a period of Eleven Weeks.

| Sheep<br>Numbers. | Weight June 5. | Weight in lbs.<br>August 21. | Pounds increase<br>in 11 weeks. | Average weekly<br>Increase. |
|-------------------|----------------|------------------------------|---------------------------------|-----------------------------|
|                   |                |                              |                                 | lbs., tenths, etc.          |
| 1                 | 117            | 161                          | 44                              | 4.00                        |
| 2                 | 103            | 133                          | 30                              | 2.73                        |
| 3                 | 112            | 147                          | 35                              | 3.18                        |
| 4                 | 108            | 148                          | 40                              | 3.64                        |
| 5                 | 101            | 134                          | 33                              | 3.00                        |
| 6                 | 106            | 143                          | 37                              | 3.36                        |
| 7                 | 100            | 131                          | 31                              | 2.82                        |
| 8                 | 123            | 161                          | 38                              | 3.45                        |
| 9                 | 115            | 155                          | 40                              | 3.64                        |
| 10                | 98½            | 142                          | 43½                             | 4.00                        |
| 11                | 113            | 145                          | 32                              | 2.91                        |
| 12                | 126            | 157                          | 31                              | 2.82                        |
| 13                | 111            | 145                          | 34                              | 3.09                        |
| 14                | 117            | 158                          | 41                              | 3.73                        |
| 15                | 113            | 145                          | 32                              | 2.91                        |
| 16                | 129            | 162                          | 33                              | 3.00                        |
| 17                | 116            | 154                          | 38                              | 3.45                        |
| 18                | 109            | 149                          | 40                              | 3.64                        |
| 19                | 114            | 145                          | 31                              | 2.82                        |
| 20                | 111            | 142                          | 31                              | 2.82                        |
| 21                | 103            | 138                          | 35                              | 3.18                        |
| 22                | 110            | 146                          | 36                              | 3.27                        |
| 23                | 107            | 145                          | 38                              | 3.45                        |
| 24                | 116            | 146                          | 30                              | 2.73                        |
| 25                | 101            | 144                          | 43                              | 3.91                        |
| 26                | 97             | 131                          | 34                              | 3.09                        |
| 27                | 115            | 158                          | 43                              | 3.91                        |
| 28                | 101            | 140                          | 39                              | 3.54                        |
| 29                | 109            | 143                          | 34                              | 3.09                        |
| 30                | 116            | 152                          | 36                              | 3.27                        |
|                   | 3,317½         | 4,300                        | 1,072                           | 3.28mean                    |

With regard to the above, Mr Lawes says:

"The rate of increase here indicated falls little short of the wider estimates usually formed on this subject; and, while we are satisfied of the correctness of the figures given above, and do not doubt the statements of others, yet we are convinced that such results are very mischievously misapplied, if it be concluded that they in any degree fairly represent the average increase obtained in practical farming. Indeed the circumstances under which these sheep were placed were in every respect the most favorable that could be imagined, viz., summer weather and the feed of a luxuriant crop of highly manured clover, with oilcake besides—conditions which at best can be equaled during a few months only of every twelve."

## TABLE

Showing the Consumption of Food and the Increase of Animal, per Week, for each 100 lbs. Live Weight.

## SHEEP.

| Description of Animal.   | Number of Animals. | Duration of Experiment. | Average Food consumed per Week to each 100 lbs. live weight of Animal. |                          | Increase per Week upon each 100 lbs. live weight. |
|--|--------------------|-------------------------|--|--------------------------|---|
|  |                    |                         | Description.   | Quantities.              |   |
|  |                    | Weeks, Days.            |  | lbs. oz.                 | lbs. oz.  |
| Hampshire Downs  | 40                 | 26 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 5 4½<br>4 11½<br>71 10 | { 1 12½   |
| Sussex Downs   | 40                 | 26 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 5 4½<br>5 0½<br>68 0   | { 1 12½   |
| Cotswolds  | 40                 | 20 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 5 5½<br>4 8½<br>74 11  | { 2 1½  |
| Leicesters   | 40                 | 20 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 4 12<br>4 8½<br>67 13  | { 1 12½   |
| Cross-bred Wethers   | 40                 | 20 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 5 0<br>4 12½<br>70 10  | { 1 14½   |
| Cross-bred Ewes  | 40                 | 20 0                    | { Oilcake . . . . .<br>Clover-hay . . . . .<br>Swedes . . . . .        | { 4 15½<br>4 11½<br>69 5 | { 1 14  |
| Hants Downs  | 8                  | 6 0                     | { Oilcake . . . . .<br>Hay-chaff . . . . .<br>Mangolds . . . . .       | { 5 9½<br>2 12½<br>64 8  | 0 14½   |
| (Fed till Christmas, i. e. 31 weeks, 5 days, longer than 40 Hants above.)  |                    | 12 0                    | { Oilcake . . . . .<br>Green Clover . . . . .                          | { 5 2½<br>ad lib.        |   |
|  |                    | 13 5                    | { Oilcake . . . . .<br>Hay and Clover chaff . . . . .                  | { 5 6½<br>1 13½          |   |
|  |                    | 31 5                    | { Norfolk Whites or Swedes   | { ad lib.                |   |
| Sussex Downs   | 8                  | 6 0                     | { Oilcake . . . . .<br>Hay-chaff . . . . .<br>Mangolds . . . . .       | { 5 10½<br>3 12½<br>70 0 | 0 15½   |
| (Fed till Christmas, i. e. 31 weeks, 5 days, longer than 40 Sussex above.) |                    | 12 0                    | { Oilcake . . . . .<br>Green Clover . . . . .                          | { 5 4½<br>ad lib.        |   |
|  |                    | 13 5                    | { Oilcake . . . . .<br>Hay and Clover chaff . . . . .                  | { 5 8<br>2 1½            |   |
|  |                    | 31 5                    | { Norfolk Whites or Swedes   | { ad lib.                |   |

It will be seen by the above, that among the breeds experimented upon, the Cotswolds gave the largest per cent. of increase per week on each 100 lbs. live weight, and also the largest per cent. of increase per week in proportion to the amount of food consumed. Dr. Lawes by a course of experiments also established the fact that to produce 100 lbs. of mutton, it will be necessary to feed 272½ pounds of oilcake, 252½ pounds of clover hay, and 3,753 pounds of rutabagas. The various conditions of the animals are taken into consideration in arriving at the conclusions, as well as the varying value of feed and its quality, together with

all the circumstances of disturbance and repose in which a flock may be kept, and he estimates that to produce one pound of flesh, it will be necessary to feed under shelter according to the following table; or if in open pasture, it will require the addition of one-half the quantity, it being based upon the calculation of there being no other food within reach of the animals.

TABLE.

|  |   |
|--|---|
| Rutabagas fed under cover, . . . . .           | 100 pounds will produce 1 pound of flesh. |
| Good clover hay, . . . . .                     | 12 " " " " " " "                          |
| Beans or Peas, . . . . .                       | 8 " " " " " " "                           |
| Oats, . . . . .                                | 7 " " " " " " "                           |
| Barley, . . . . .                              | 6 " " " " " " "                           |
| Linseed oilcake meal, . . . . .                | 6 " " " " " " "                           |
| Linseed oilcake meal and peas mixed, . . . . . | 4½ " " " " " " "                          |

The value of mixed food will be seen in the last item, where oilcake meal and peas mixed will produce one pound of flesh for every four and a half pounds, while peas alone require eight pounds for that result, and oilcake six pounds.

When fattening sheep for mutton, the kind and quantity of food will depend much upon the age and general condition of the animal, viz.: whether the sheep is growing, or has reached maturity; whether there has been a drainage of the system by breeding or furnishing milk for lambs, etc. By separating the flock to be fattened, and grading them according to these conditions, putting those of a grade together in a pen, better results will be reached than by feeding all together. The noted Dr. Voelcker, of the Royal Agricultural Society of England, found that by feeding four sheep on stated rations for seven weeks, the following results were obtained: The animals consumed during this time 196 pounds of clover hay, 49 pounds of linseed-oilcake, 3,743 pounds of mangel wurtzels, which furnished a daily ration to each animal of 1 pound of clover hay, 4 ounces of oilcake, and 19½ pounds of mangels. The nutritive element contained in this daily ration would be, according to scientific estimate, about 4½ ounces of flesh or muscle element, 53½ ounces of fat element, and 4¾ ounces of mineral element.

The result obtained was:

|            | Weight at commencement. | At end of seven weeks. | Gain of each in weight. |
|------------|-------------------------|------------------------|-------------------------|
| No. 1..... | 153 pounds.             | 170¼ pounds.           | 17¼ pounds.             |
| No. 2..... | 134 "                   | 151¼ "                 | 17¼ "                   |
| No. 3..... | 170 "                   | 187 "                  | 17 "                    |
| No. 4..... | 135 "                   | 155 "                  | 20 "                    |

It has been ascertained by repeated experiments that 100 pounds of roots fed in a yard provided with shelters will give one pound of live weight to the sheep, while if the sheep be fed in an open pasture, without protection from the climate, it will require 150 pounds to produce the same result, and this relative proportion will usually prove true with regard to other kinds of food.

It has also been demonstrated that if one and a half pounds of oil cake is given daily with the root feed, the increase will be two pounds for every 100 pounds of roots. When peas, beans, and hay were fed with the roots, it was found that eight pounds of this mixed feed would make an increase in weight of one pound; seven pounds of oats or six pounds of barley, with the same quantity of roots as before, gave also one pound of increase in weight. Mr. E. W. Stewart, one of the best authorities on this subject in the country, gives his opinion as follows on fattening sheep for market, showing the different results of feeding (1) pure corn, (2) oats and corn, (2) bran, oats, and corn, (4) oil meal and corn, (5) roots and corn:

" 1. Pure corn, as a food for fattening sheep in connection with hay, has been used more in this country than any other grain. Corn is one of the best fattening foods at our command when judiciously used. It contains 62 to 66 per cent. of starch, and 5 to 7 per

cent. of oil, and these elements are very digestible in corn. The starch is most admirably adapted to the production of animal heat, and the surplus goes to lay on fat; besides, the 5 to 7 per cent. of fat is ready formed to be deposited in the animal body. But corn contains these carbonaceous elements in such large proportion as to make it too heating when fed alone in large quantity. The albuminoid or muscle-forming element of corn ranges from 8 to 10 per cent., giving a nutritive ratio of one of albuminoids to from 7.5 to 10 of carbohydrates—this is too low a nutritive ratio for fattening, unless combined with more nitrogenous food. But if good clover hay form part of the ration, then corn makes a very profitable addition. Clover has a nutritive ratio of from 1.4 to 1.7. And if the ration is composed of 2 pounds of clover hay and 2 pounds of corn, it gives 3.40 pounds of dry food, with a nutritive ratio slightly under 1.6, which answers well for a fattening ration. And as sheep are fattened largely in winter, corn is found to be one of the best foods to keep the sheep warm, and thus assists in the laying on of fat.

2. Oats and corn, mixed in equal weight, constitute a most excellent grain ration for sheep. The oat has a larger proportion of albuminoid and less of starch than corn, and, thus combined, the ration is less heating, and is especially appropriate for summer fattening. One and a half to two and a half pounds of this mixed grain, fed with any fair quality of hay, will be a successful fattening ration for sheep.

3. Bran, oats, and corn, mixed in equal weights, form a ration, better, perhaps, than the last, because the bran has a larger proportion of nitrogen than oats, therefore reduces the nutritive ratio and improves the combination. Bran is also cheaper than oats, and therefore reduces the cost of the ration. Three pounds per head of this combined ration, fed with straw even, will be successful, or if fed with two pounds of good hay may be reduced one-half.

4. Oil meal and corn have been used as a practical ration with great advantage. The new-process linseed meal, which contains more albuminoids and less oil, will be quite as good as the old-style oil meal to combine with corn, because corn is so rich in starch and oil that they balance each other. One-half pound of linseed meal or decorticated cotton-seed meal, with  $1\frac{1}{2}$  pounds of corn, makes a good combination, and 2 pounds of the mixture per head, with any kind of hay, will be a full ration for most sheep.

5. If we compare turnips with corn, we find 3 pounds of corn fully equal to 22 pounds of Swedes, and 1 bushel is equal to 411 pounds of Swedes, and 40 bushels (or one acre) of corn equals  $8\frac{1}{2}$  tons of Swede turnips; and this, in the West, with corn at 30 cents, would make turnips worth only \$1.48 per ton, and at 50 cents per bushel corn would be as cheap as turnips at \$2.42 per ton. It is hardly probable that roots will ever be raised in this country as extensively as they are in England, because, when compared with grain as to nutriment, they are no cheaper; but they have a great value in promoting the health of sheep and cattle, and they should be used in moderate quantity for that purpose, making up the ration with other food.

The combination No. 4 will generally produce the most rapid fattening, and the oil meal will have about the same laxative operation upon the digestive organs of the sheep as a moderate feed of turnips. It is no doubt economy to feed a small quantity of oil meal, say one-fifth to one-fourth of a pound, with all the rations mentioned, except perhaps with turnips. The oil meal would not increase the cost of the ration materially, as it would reduce the other elements of the ration. The oil meals are peculiarly adapted to the growth of wool, and promote its quality. Sheep-feeding requires a very observant shepherd, who can take into consideration the individual wants of his flock. There is no department of feeding requiring more skill."

**Hurdles for Sheep.**—These are often a great convenience in confining sheep to pastures or cultivated fields, such as of turnips, rye, etc., and are sometimes used in this country, though not extensively. Mr. Killebrew thus describes them:

"Take a four-square scantling, any length desired, and bore holes through it at right angles, one on each side alternately, about ten inches apart. Then put through these holes stakes six feet long. The holes should be two inches in diameter, and the stakes should be of good, tough white oak. When completed, it will have the stakes projecting in four directions three feet long. Laid upon the ground, it presents a *chevauc de-frise* that no sheep will jump. A double row of these laid across a clover lot enclosing ten or fifteen feet in width will confine the sheep to that spot, and prevent tramping or picking over the whole field. Not only this, but when they have passed over the field, which is done by simply rolling the double racks, which they resemble, over and over, as the clover is eaten clean, the clover in the rear has renewed itself, and is ready for another going over. This plan applies not only to clover, but to any kind of pasturage, such as sorghum, rye, Egyptian grass, or any of those cultivated grasses that will grow from the stub after being eaten down.

By judicious management of this hurdle a field infested with noxious weeds can be cleaned completely of them, and at the same time brought to a surpassing state of fertility."

**Salt for Sheep.**—It is asserted by some flock-masters that no one thing contributes more to the health of sheep than salt. However this may be, it is absolutely certain that salt is very essential to the health and general welfare of the flock, and that sheep cannot thrive well without it.

It obviates injury from the great and sudden change from dry to green food in the spring, often so detrimental, and is a preventive against fermentation of the green mass in the stomach, as well as of some of the other difficulties and diseases to which sheep are liable.

The best manner of supplying the flock with salt is to have it in boxes where it will be well protected from the rain, and where the sheep can have access to it whenever they wish. If this plan is not followed, they should have a supply given them at least once a week. Some shepherds prefer a little sulphur mixed with the salt. We believe those flocks thrive best, other conditions being equal, that have a constant supply of salt, and clean, fresh water, where they have access to them whenever they choose.

**Water Supply for Sheep.**—Although it is often claimed that sheep are an exception to domestic animals generally in respect to the necessity of a supply of water in order to be kept in a thrifty and healthy condition, and that they can get along just as well without it, depending upon the dew that is nightly deposited upon the grass for quenching their thirst, yet we doubt if any sensible shepherd of sufficient practical experience to thoroughly understand his business would concur in such an opinion. That sheep can live in pastures without a supply of water is probably true, and cannot be denied; but that they will thrive as well with such treatment, and prove as healthy or profitable, we do not believe can be proved. The regularity with which they visit the accessible drinking places, and the pleasure and satisfaction evinced by them as they there slake their thirst, proves that Nature intended water as much for the sheep as other animals, and leaves no ground for debate as to the desirability of having a plentiful supply of good water within their reach. Sheep require less water than most of the other domestic animals, but they should never be subjected to the entire privation of it. It is often noticeable in a flock of sheep, when being driven quite a distance, that, although they may be very tired from a long journey, they will sometimes, all at once, seem inspired with a new impulse, and, lifting their heads, hurry off in a certain direction, as though all were of one mind respecting reaching a certain point as soon as possible—it may be a mile or more distant—the entire flock often galloping off in "sheep-trot" style in that one direction, which, when the point is reached, will be found to be a spring or other water supply, where they will quench their thirst; thus showing how much keener is the sense with which they will scent water than that of any other animal, and how

much they relish it. All of which are the more than infallible hints that nature gives the shepherd, that in supplying his sheep with an abundance from the "green pastures," he should forget not the "still waters."

**Shade in Sheep Pastures.**—A sufficient number of trees to give shade in pastures during the sultry season to stock that may be pastured there, are of great value to any field. A few spreading trees are not only attractive, and therefore an ornament to a pasture, but are a necessity to the comfort and welfare of animals that may occupy it.

Anything that contributes to the comfort of our domestic animals contributes in a corresponding degree to their profit, for without comfort and contentment among them, there will not be any great degree of thrift, and no farmer has any reason to expect his sheep to thrive without shelter from the scorching sun in the heated summer season,—conditions that he would find intolerable himself.

Aside from the question of humanity, which ought of itself to be a sufficient reason for restraining the owner of stock from permitting his animals to be subjected to any species of cruelty, the profits arising from rendering them comfortable will amply repay for the trouble and expense involved; therefore where the sheep pastures are not already shaded by trees, we would advise that cheap sheds be made in sufficient numbers to accommodate all with shade, and thus render them comfortable. The labor and expense involved will be but a trifle compared with advantages thus gained. As in considering the question of providing water for sheep, their natural instincts are a sure and safe index of their necessities; and it is a well known fact that they will eagerly seek shade when it is within their reach, and will endeavor to make a shade by crowding together and dropping the head under each other's bodies when no shade is to be found in the pasture.

Some shepherds provide shade by means of cheap open sheds of boards; others by throwing boughs upon a framework of posts and poles; better than either is a little grove of trees of sufficient size to make a good shade for the whole flock. To obviate the danger of developing and spreading infectious diseases by the flock spending so much time closely huddling together, the sheds (which may be made movable) can be occasionally moved to fresh ground; or, if made permanent, the ground underneath can be thoroughly scraped, the manure removed, and the place of rendezvous made fresh by plowing, thus bringing the cool, clean soil to the surface to come in contact with the feet and bodies of the sheep. Every man should "be merciful to his beast," and nothing shows the quality of true manliness more than kindness and mercy extended to aught that can suffer, whether it be to man or beast. Hard and indifferent must be the nature of him who could impose needless suffering upon so meek and patient an animal as the sheep, while, as we have previously stated, in considering the profit, this comfort can be so easily obtained, and will result in so great advantage in a money point of view, that no farmer or shepherd that has an eye to economy should fail to give it the attention that the subject demands.

**Washing Sheep.**—The practice of washing sheep two or three weeks before shearing, formerly so common, is recently becoming unpopular, and we hope the time will soon come when it will be discarded entirely. We believe it not only an injurious custom, as far as the flock and the washer are concerned, but it is a cruel one as well, to plunge such a timid animal as a sheep into a stream of cold water, thus suddenly reducing the temperature of its body several degrees, and half paralyzing the poor animal with fright; besides, they must of necessity carry a wet fleece for some time, which will often be the cause of disease, such as colds, catarrh, chills, fevers, rheumatism, etc., to say nothing of the discomfort or suffering that may result.

Washing is also a means of often spreading a contagious disease in a flock, such as foot rot, or scab, by washing one or two animals affected by it in the same locality. It is some-

times the cause of garget in nursing ewes, and abortion with those in lamb. Sheep are often driven a long distance to be washed, when no suitable stream is near the farm, and in warm weather, which it must be of necessity, that the water of the brook or river be suitably warm for the purpose, and even then the change of temperature in plunging them into the stream must be very great. Sheep have been known to suddenly die in the water under such circumstances. A farmer of large experience in sheep-breeding tells us that he had one die in this manner recently, which, when taken into the water, seemed paralyzed by the shock, and died with scarcely a struggle. It could not have been drowned, for its head was out of the water, and it would have been impossible for a sheep or any other animal to have drowned under the circumstances.

At another time he had a fine sheep die a few hours after washing, that to all appearance was perfectly well before. Besides the labor of washing, and danger to the sheep, it is much more dangerous to those who perform the work to stand in water for several hours, and many serious diseases, if not deaths, have been occasioned by it. It must indeed be a vigorous constitution to endure the ordeal unharmed. The water of streams in which sheep are washed often becomes muddy by disturbing the sediment or sand at the bottom, which settles in the wool and injures it.

Again, good judges of wool, who are, with rare exceptions, the buyers, can tell very accurately, even to a fraction, what will be the shrinkage, which is generally one-third, in cleaning, and manufacturers always cleanse every fleece of wool before using it; therefore we consider washing the fleece on the sheep entirely useless; besides, as sheep are not sheared for at least two weeks after washing, the wool will accumulate considerable foreign substance in that time,—a fact known to wool buyers, and they base their prices accordingly.

Besides the objections previously given, washing is a very inconvenient practice in the cooler temperatures, and at the North the shearing is often delayed very late, in order that the water of streams may be sufficiently warm for the purpose, while the temperature of the atmosphere might be warm enough for shearing considerably earlier. It also requires time for wool to regain its former softness and elasticity after washing. We have often seen sheep that looked much worse after washing than before, by being driven a long distance over a dusty road after the process. Where farmers prefer to have their wool washed before selling, it can be done much easier and better in the fleece than on the sheep's backs, but we would advise that the entire cleansing process be left to manufacturers.

Sheep should be kept as clean as possible without washing, and care taken to prevent the accumulation of all foreign substances, such as burs, twigs, hay-seed, etc., and all fragments of wool that have become filthy with manure (which is common where sheep are first turned out to grass) should be clipped off. With a little care a flock can be kept quite clean. When hay is stored over a shed in which sheep seek shelter, the floor on which the hay rests should be very tight to prevent the hay seed and dirt from sifting down on to the backs of the sheep, as this accumulation is quite difficult to remove and damages the looks of a flock of wool fleeces when sheared.

To all farmers we would say, whatever has been your former practice, don't wash your sheep, for it is a worse than needless task.

**Shearing.**—The shearing of sheep is an art only to be acquired by practice, whether it be performed by hand or machine, and not every one who professes to be an expert in the business will be shown to be such by his work. Great injury is often done both the sheep and wool by rough handling or carelessness in cutting, in which case either the skin of the sheep is cut, or the staple of the wool injured by being severed, or by not being cut sufficiently close; a very little carelessness resulting in making a wound in the skin that will require nearly all summer to heal, or in leaving sufficient wool in unsightly ridges about the head, flanks, legs, and other portions of the body to more than equal in the aggregate, the cost of

shearing; therefore if a farmer wishes to know whether his sheep are well sheared, he should not only look at the sheep to see if it be smoothly shorn, but also at the inside of the fleece to see if there are any short pieces of wool, caused by severing the staple, as a sheep may be smoothly shorn and the fleece badly injured in this manner. Wool buyers are very particular about the latter, since an occasional severing of the fibre is a great damage to the quality of the wool.

Sheep should be sheared in a warm, bright day, and *never* in damp or chilly weather. The practice of many farmers of waiting for a rainy day, that cannot be appropriated to any other farm work, is a pernicious one, as the sudden change of removing so warm a covering from the bodies of the animals is a very great change to them, even in warm weather, and often results in their taking cold.

When the work is performed by hand, the operator should be provided with a good sharp pair of shears and the means of sharpening them, as dull tools in this business are a great hindrance, and involve not only loss of time, but work imperfectly performed. Some shearers prefer to work upon a barn floor, laying the sheep down and taking a position beside it, resting on the right knee, while others prefer a bench from twelve to eighteen inches high, on which the sheep is laid, the shearer standing beside it; in both instances the left knee braces the body and supports the sheep in the several positions that are necessary for convenience in shearing.

Some prefer the bench on which the sheep are placed in shearing considerably higher than the above mentioned. The bench should be perfectly smooth to prevent any injury to the fleece or sheep, the barn floor to be kept as free from dust, straw, or other accumulations as possible, cleanliness in wool, and freedom from all foreign substances affecting its quality. The shearer should possess patience and ingenuity, a steady hand, and a determination to do honest work, which, combined with a little practice, will soon result in the acquisition of considerable skill in the art. It is hard labor for both shearer and sheep, especially the latter, and both should have as comfortable a position as possible. Unless the position of the sheep be easy, it will cause much trouble by struggling, besides injuring the appearance of the fleece.

The wool should be cut rather close, taking great care not to cut the skin or teats. When the skin is once cut it often requires a long time to heal. When such an accident occurs, the wound should be completely covered with tar, to prevent the maggot fly from depositing its eggs in it.

There are various methods of shearing. Some place the sheep on the left side and begin by cutting all the tags off, which are put in a basket one side, that they may not be mixed with the wool. Placing the shears near the right flank, pointed towards the fore legs, they shear first the belly of the animal; then placing the sheep on its rump, with feet projecting outward and head bent over the shearer's left knee, shear the neck, head, and legs; afterwards the sides, letting the fleece roll off at the rump. Others prefer to open the fleece at the neck, shearing the belly and legs with the sheep in position on its rump, and afterwards shear the sides and back of the animal.

Others still set the sheep on its rump and shear the neck and fore shoulders; then lay it upon one side, and when the upper side is sheared, turn the animal over and take the wool from the other. In cutting, the hand should be kept well away from the body of the animal, so as to bring the point of the shears near the skin, and never take but one cut at the same length of fibre; if two cuts are taken, the fibre is injured. The main fleece should always be taken off whole, and if the sheep is gently and carefully handled, combined with skill in using the shears, it will come off in this manner.

The wool from the belly and portions from the head and neck with trimmings from the flanks and legs are separate, and are usually rolled up inside the fleece in packing it, though

in some sections they are sold separate as a different quality of wool, being of shorter staple than the fleece.

Sheep should not be sheared so early in the season as to be exposed to an undue cold temperature, neither should the process be delayed so late as to render the wool burdensome to them, or not to give the wool a good growth before autumn. They should never be exposed to rains or cold winds immediately after shearing, as they will be liable, from the great change of losing their fleece, to take cold and have a fever, or lung disease; hence, it will well repay the owner to take especial care to shelter the flock in unfavorable weather at this trying period. Even heavy dews will sometimes produce the same effect after the fleece has been removed, until they are accustomed to the change. If the weather be too hot or sultry after shearing, the sheep should have a good shady retreat in which to be protected from flies, and the hot sun, since the skin is then very tender, and will be liable to blister or be otherwise permanently injured.

It is well to have the sheep penned but a short time before shearing, as when recently taken from a fresh pasture with full, round bodies, this process is more easily accomplished than when lank and thin from empty stomachs. By the use of a machine, the process of shearing is greatly facilitated, and the wool is cut more evenly and closely than by hand, and also without clipping the staple a second time, as is often the case when shears are used. The following account of a recent sheep shearing in Australia, taken from an Australian paper, will give the farmers of this country some idea of the magnitude of sheep husbandry in that country:

"Edocs & Co., of New South Wales, had recently upon one of their sheep farms at Burrawand a sheep-shearing which lasted ten weeks and was concluded early in December, during which time no less than 206,123 sheep were shorn! To do this work 100 shearers, in addition to the 'station hands,' were employed, and in a single day 8,216 sheep were deprived of their fleeces. The aggregate yield was 2,512 bales, the gross weight of which was 466 tons. On previous occasions the same parties have shorn over 214,000 sheep; but this has been the largest amount of wool ever produced at a single shearing."

**Packing the Fleece.**—The manner in which the fleece is packed has much to do with its sale; hence, special care should be taken to have the packing done as neatly as possible. It should be clipped of all tags and filth, either before being taken from the animal or after. It should be laid on a perfectly smooth bench or table, with the outside uppermost; push the wool carefully together to make it somewhat compact; then turn the ends all in, such as the neck and legs, to make the ends straight, and double the sides over to the centre; if the loose wool is to be included (which is the usual custom), put them in the centre and roll from the end in a moderately tight package, and tie with good twine. This makes a neat, smooth package that can be readily handled and examined, as the inside of the fleece (or that grown nearest the skin), constitutes the outside of the package when rolled.

When the wool is to be shipped, it will be necessary to put the bundles in bags or boxes. They should be packed into as small a compass as possible, and the box or bag securely fastened, after which they should be weighed, and the weight and quality marked upon them. The tags can be prepared for sale by washing in strong soap suds, and pulling them to pieces until all the dirt is removed; after which rinse in soft water. Some recommend dipping them repeatedly in strong salt and water made as hot as the hands can bear, before washing. These should be packed separately as inferior wool, although they often make wool of medium quality, and would otherwise be worthless.

**How to Determine the Age of Sheep and Lambs.**—Although some breeds of sheep mature much quicker than others, and much depends upon the manner in which they are cared for, however, a few general rules may be given for determining their age, which may be regarded as sufficiently definite for all practical purposes.

At one month old the lamb has eight temporary front teeth, and three temporary molars on each side of the jaw; at three months a permanent molar is added to each of these three. At nine months the second permanent molar appears; at fourteen months the first two permanent incisors (nippers or cutting teeth) appear in the front of the lower jaw; at eighteen months the sixth and last molar tooth appears. A second cutting tooth appears on each side of the first pair; at twenty-one months two more cutting teeth appear; at twenty-seven months the temporary molars are replaced by permanent ones; at thirty months two more cutting teeth are added, and at thirty-six months two more cutting teeth and the last pair appear. There are then eight incisors and twenty-four molars or grinders, or thirty-two in all, and the sheep full-mouthed and mature.

The law of England has decided that a lamb becomes a sheep when the first pair of cutting teeth appears, which is at the age of fourteen months.

Professor James Law expresses his opinion on determining the age of sheep, as follows:

"The books on sheep have seriously misled flock-masters on this subject. Almost any sheep owner will tell you that after a year the sheep gets a pair of broad teeth yearly, and if you show that his own three-year-olds have four pairs of broad teeth, he can only claim that they are exceptions, and protest that they do not exceed three years of age. Now these cases are no exception, for all well-bred sheep have a full mouth of front teeth at three years old. Some old unimproved flocks may still be found in which the mouth is not full until near four years old, but fortunately these are now the exceptions, and should not be made the standard, as they so constantly are.

In Cotswolds, Leicesters, Lincolns, South Downs, Oxford Downs, Hampshire Downs, and even in the advanced Merinos, and in the grades of all these, dentition is completed from half a year to a year earlier. The milk or lamb teeth are easily distinguished from the permanent or broad teeth, by their smaller size, and by the thickness of the jaw-bone around their fangs where the permanent teeth are still enclosed. As the lamb approaches a year old, the broad exposed part of the tooth becomes worn away, and narrow fangs projecting above the gums stand apart from each other, leaving wide intervals. This is even more marked after the first pair of permanent teeth have come up, overlapping each other at their edges, and from this time onward the number of small milk teeth, and of broad permanent teeth, can usually be made out with ease.

Another distinguishing feature is the yellow or dark coloration of the fangs of the milk teeth, while the exposed portions of the permanent teeth are white, clear, and pearly. The successive pairs of permanent teeth make their appearance through the gums in advanced breeds at about the following dates: The first pair at one year; the second pair at one year and a half; the third pair at two years and three months; the fourth and last pair at three years. It will be observed that between the appearance of the first two pairs there is an interval of six months, while after this each pair comes up nine months after its predecessors. For backward grades, and the unimproved breeds, the eruption is about six months later for each pair of teeth, but even with them the mouth is full at three years and six months."

As a general rule, if well fed and kept in a thriving condition, sheep will shed their teeth faster, and *vice versa*.

**Sheep as Fertilizers.** — With respect to the agency of sheep in improving the fertility of the soil, we quote the following from the pen of Hon. John L. Hayes, of whom we have made previous reference in this work, and as one of the best authorities on sheep husbandry in the country:

"Sheep are the only animals which do not exhaust the land upon which they feed, but permanently improve it. Horned cattle, especially cows in milk, by continued grazing, ultimately exhaust the pastures of their phosphates. In England, the pastures of the county

of Chester, famous as a cheese district, are kept up only by the constant use of bone dust. Sheep, on the other hand, through the peculiar nutritiousness of their manure, and the facility with which it is distributed, are found to be the most economical and a certain means of constantly renewing the productiveness of the land. By the combination of sheep husbandry with wheat culture, lands in England which in the time of Elizabeth produced, on an average, six and a half bushels of wheat per acre, produce now over thirty bushels. For these reasons, the recent practical writers in the Journal of the Royal Agricultural Society of England pronounce that, while there is no profit in growing sheep in England simply for their mutton and wool, sheep husbandry is still an indispensable necessity, as the sole means of keeping up the land.

Experience in the United States leads to similar conclusions. Mr. Stilson, of Wisconsin, by keeping sheep, is able to raise his twenty-four bushels of wheat to the acre, while the average yield of wheat in Wisconsin is but ten bushels. There are cases in Vermont where sheep farmers have been compelled to abandon one farm after another as they became too fertile for profitable sheep growing. Mr. George Geddes, whom Horace Greeley used to regard as the highest authority on agricultural matters in the State of New York, and who has raised sheep for many years in connection with wheat, says that, with one sheep to the acre of cultivated land, pasture and meadows, he raises more bushels of grain, on the average, than he did when he had no sheep to manufacture his coarse forage into manure, and to enrich his pastures to prepare them for the grain crop; that the land is constantly improving, and the crop increasing in quantity; and that, while producing crops on less acres and at less cost than he did before he kept sheep, he has, *in addition, the wool and the mutton produced by the sheep.*

Mr. William Chamberlain, of Red Hook, Dutchess County, New York, celebrated as a grower of Silesian sheep, purchased, in 1840, a farm in that place of 380 acres, which had been used so long for selling hay that it was worn out. The hay crop, in 1841, was seventeen loads; forty acres of rye gave ten bushels to the acre; twenty-five acres of corn averaged twenty bushels to the acre; the rest of the farm pastured two horses, four oxen, and one cow. The land was so poor that it would not raise red clover. By using sheep as the producers and manufacturers of manure, he made this worn-out farm so productive that its crops would be satisfactory even in Ohio. The product, in 1866, was 600 tons hay; 40 acres of Indian corn, yielding 50 bushels to the acre; 30 acres of wheat, averaging 15 bushels; 30 acres of oats, 8 acres of roots, and the pasturage of 300 sheep, and of the teams, cows, etc., necessary to carry on the farm and to supply the families on it with milk and butter.

Mr. Chamberlain's plan, when he first commenced making manure by using sheep, was to spread it thinly, so as to go over all the surface he could, and make clover grass; and he said that when he had brought his land to where it would produce clover, improvement thenceforth was easy and rapid. The sheep not only gave a first impulse, but were all the time depended upon as the great manure-producing power.

The farmers of Connecticut in former times appreciated the fertilizing influence of sheep. In Goshen, Conn., the public roads were anciently laid out eight rods wide; and in these highways it was customary to pasture sheep, which were taken care of by a man and boy at the expense of the town. The yarding of the sheep at night that the manure might not be lost was let out at the town meeting. On the night of May 27th, preceding the cold summer of 1816, it was the turn of a certain farmer to yard the sheep for the night. He had no field which would hold the sheep—some 800 in number—except one planted with corn which had just come up. Preferring to sacrifice the corn rather than lose the manure, he turned the flock into his corn field. On that night the frost cut off all the corn in the town and the sheep cut off the corn of the said farmer, who congratulated himself in the morning that he was no worse off than his neighbors. He soon found, however, that he was

better off. The sheep, by feeding on the corn saved it from the frost, and the droppings of the sheep in one night so enriched the field that it produced the largest crop of corn that had been grown in the town for years."

Sheep graze more closely and keep the pastures in much better condition than any other animal, and will do well where other animals would hardly gain a subsistence.

**Wool and its Uses.**—Unlike the culture of cotton and other textile materials, the cultivation of which is confined to certain localities of our country, wool-growing can be successfully practiced in every State in the Union and its territories, being suited to all soils and climates. The South and West are sections peculiarly adapted to this enterprise, while in New England it must of necessity be limited, owing to the density of the population and the small size of the farms in that section. In the South the season for winter feeding is much shorter than at the North, affording an opportunity to depend more upon pasturage in maintaining the flocks, while the well-sheltered valleys afford protection from the severity of storms in winter and induce an early growth of spring grasses. The infertile and worn-out lands can by this means be reclaimed to cultivation and fertility.

By the more general recognition of sheep husbandry as an adjunct of Southern Agriculture, for a few years a marked improvement in soil, general agriculture, individual and State wealth must of necessity follow. The remarkable success attending wool growing in New South Wales, which is a region of excessive heat, proves what can be accomplished in such climates. The admirable facilities for wool growing in the Western States and Territories, and the success already attained in it there,—where it is but yet in its infancy,—gives promise of what may yet be accomplished in this direction in the future.

In a recent article on the Wool Industry in our National Economy, Hon. John L. Hayes says,—after referring to pastoral sheep husbandry as of the first importance as a means of settling new territories:—

"The relations of domestic wool to domestic manufactures are equally conspicuous and important—the rule being that the characteristic wool manufactures of the leading nations have been determined by the abundance and peculiarities of their raw material. Turkey makes but few, and exports no cloths, but her carpets and rugs, made from the wool of the barbarous sheep, are sought everywhere; England, the home of the combing-wool sheep, was the inventor of the countless dress fabrics into which the fleeces enter; Germany produced the electoral fine-wool sheep, and her light, fine broad-cloths dispute with all rivals for the markets of the world; France created the Merino combing-wools, and from them established her prestige in the fabrication of the luxurious dress goods which in their infinite variety contribute to the adornment of the female world.

The wool manufacture of the United States is dependent upon domestic wool production. 'The two branches of wool industry have always stepped together, though unconsciously quickened or retarded by the same influences. As the flocks spread in the new State the mills were planted in their midst—not clustered in a few centres, as in Europe, but broadly scattered, like sheep feeding in a wide pasture.' The more prominent wool-growing States have woolen mills as follows: California 10, Illinois 99, Indiana 157, Iowa 98, Michigan 55, Missouri 57, Ohio 187, Oregon 9, Wisconsin 67—all using American-grown wool, and mostly produced in their immediate neighborhoods. 'It is safe to say that not one of these mills would have been established but for the contiguous flocks, and if forced to seek imported wool, each one would stop.' But consumption of domestic wool is not confined to Western manufactures. Manufacturers prefer American to foreign wool. The census of 1880 indicates an enormous preponderance of the domestic article over the foreign. Two reasons are assigned for the superiority of American wool. The first cause is a physical one—our characteristically dry climate. The second is a moral one—as a rule the farmer is his own

shepherd, and brings to the care and improvement of his flock an intelligent oversight that may in vain be looked for in any of the countries whence clothing wools are exported."

**Classes and Grades of Wool.**—Wool is divided according to the length of its staple and fineness; thus we have the clothing wool, the combing, and the carpet or coarse wools. It is divided by governments for tariff and wool merchants into these three classes, each of which have their respective grades. Wool merchants separate each division into as many classes or grades as there are distinct qualities of staple in each division, to suit the purchaser. Manufacturers take the fleeces and separate them into as many classes as there are distinct qualities of staple in each fleece, according to its length, color, lustre, fineness, etc.

Clothing wool is generally divided into three classes, viz.: fine, medium, and coarse.

The superfine, or finest of the fine wool, is essential to the manufacture of the finest faced goods, such as broad-cloths, doeskins, etc. Fine wools are also necessary for making various other kinds of fabrics, such as cassimeres, overcoatings, and the finer qualities of gentlemen's apparel.—shawls, flannels, cashmeres, merinos, and other varieties of ladies' dress goods, etc., besides all mixtures of wool with shoddy; the largest and finest wools being used to carry wool substitutes.

Combing-wools are used for shawls, fancy knit goods, worsteds, alpacas, mohair lustres, damask for furniture, all kinds of reps, etc. The combing of wool consists in drawing out the fibres straight and parallel; then twisting into threads called worsted, the ends in spinning being covered, making the yarn smooth and lustrous. The staple is generally from five to eight inches long, having a few spiral curls or serratures with distinct lustre.

The wools of the Cotswolds, Leicesters, Lincoln, and Down breeds are especially adapted to combing purposes.

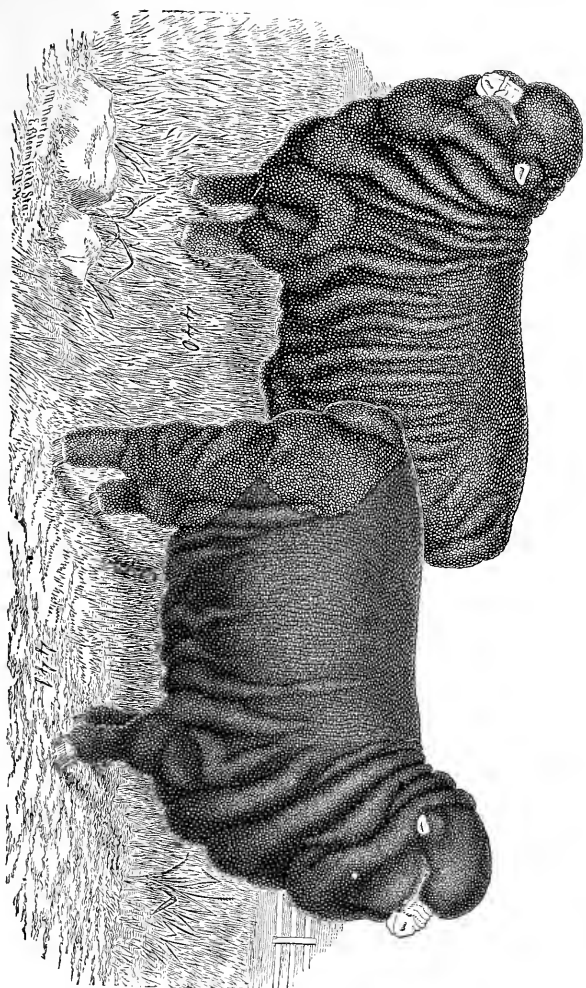
The coarser the staple, the longer it generally is. Combing wools are classed into fine, medium, and coarse grades.

Carpet or coarse wools are used for the warp of ingrain carpets, two or three-ply, and the filling of Brussels. The longest is combed for this purpose, while the shorter-stapled coarse wool is used for the carpet fillings. It is also used in the manufacture of blankets, rugs, etc.

The value of all kinds of wool is determined by its strength, lustre, working qualities, and shrinkage. Sheep that are not well cared for produce a wool of inferior quality, being coarse and uneven in fibre, consequently wanting in strength and the other qualities essential to rendering it valuable. Hon. J. L. Hayes, who, in company with able foreign and American experts, had an opportunity, in his official capacity, to study our own wool products in comparison with those of other countries at the International Exhibition, says:

"In woolens proper, we make, with no exception now occurring to us, all the classes of fabrics made in the best European mills. The same may be said of hosiery. In worsteds, we make all mixed cotton and wool dress goods—the classes of dress fabrics entering into most general consumption, and therefore of the first utility—and many all-wool worsteds. We do not make the all-wool merinos and cashmeres, which are not made successfully even in England, nor some other fine wool novelties in dress goods, which are obtained wholly in France. Their use is confined to the wealthy and fashionable classes. Some we have very recently attempted with signal success—such as the all-wool merino plaids and matelasses—and shall doubtless make them all, except possibly the merinos and cashmeres. In carpets we produce every variety, except the Persian and Turkish and the Aubusson hand-made carpets, used only by the opulent classes.

In woolens, we are inferior only in broadcloths, and that not in quality but in quantity of production, the general disuse of broadcloth, except for dress suits and by the wealthy, making it more profitable for our mills to run on goods in general demand. That we have no want of capacity is shown by the product of the few mills who still pursue this branch



**MERINO EWES.**

Owned by C. M. Fellows, Manchester, Mich. At a public shearing these two ewes clipped 83 lbs. of wool when two years old.



of manufacture, and by the fact that the finest sample of broadcloth shown at the Exposition, though not for competition, was made in this country twenty-three years ago. In blankets and flannels, our products are absolutely unequalled by any made abroad. In fancy cassimeres and worsted coatings — the great articles of consumption all over the world — we equal any, surpass most, made abroad, in texture, finish, and beauty of design; foreign manufacturers eagerly seeking samples for imitation in their mills. Our thicker cloths for overcoatings suffer nothing in comparison with those made abroad.

In dress goods, there was little opportunity to make comparison, as Bradford, the principal competitor in classes of goods made by us, did not think it wise to enter the field. But the command of our own market against foreign competition settles the question as to the quality of our goods. In carpets of the cheaper and medium qualities, up to two and three-ply ingrams, we are without competition, making the cheaper kinds so abundantly and cheap, that no home, however humble, need be without this most characteristic of household comforts. The extent of their use in our homes was a subject of surprise to our foreign visitors. The higher classes of tapestries and Brussels, and still higher, of Wilton and Axminster, in taste of design and perfection of texture, were absolutely equal to the best foreign samples; and, judging from the length and closeness of the pile, surpass them in wearing qualities. In this department, we have nothing to learn abroad.

That system of production and consumption proves itself to be most economical to the people which makes consumption the most *abundant*. That our people are the most abundantly and substantially clothed of any in the world needs no demonstration. It is shown in our army, and the vast superiority of its cloths over those furnished to any foreign troops. It is shown in what foreigners at Philadelphia so much admired — the beauty of the uniforms of our volunteer troops. It was shown in the costumes of the millions at the Exposition; and, especially, in the absence of all distinction of garb in the people of the seaboard cities, and the remotest interior. The personal appearance of a population indicates its social condition; and thus the woolen industry performs its last part in the national economy by abolishing the outward distinction of class, and cultivating the personal self-respect of the individual citizen."

**Sheep Ranches.** — The ranches or extensive farms devoted especially to stock-raising in many of the far Western States and Territories, sometimes comprise hundreds of thousands of acres, furnishing pasturage to thousands of sheep, which under the charge of one or two ranchmen and their faithful shepherd dogs, are pastured during the day and returned to the corrals or inclosures, for protection at night. The leader of the flock is often a Mexican goat.

One of the first requisites in establishing a sheep ranch is to find a good supply of water and have it centrally located in a district of good pasturage, where the ranchman proposes to graze his sheep. The usual allowance of range is five acres for each animal; consequently, a very large tract of land is required for keeping several thousand sheep. They are always corralled at night for protection against wolves and other animals. Cattle and sheep should never be kept together on the same ranch, as the sheep eat the grass down so closely that nothing is left for the cattle, and they also leave an odor which is offensive to the latter. The cost of managing sheep is greater than that of handling cattle, yet the returns are generally quicker and larger, since a herd of young cattle begins to yield an income only at the expiration of about three years, while the sheep yield a crop of wool the first summer they are driven upon a ranch, and the increase of numbers is much larger. They are also easier to take care of than cattle; hence, the life of a shepherd is less laborious than that of a cattle herder.

Sheep should be herded both summer and winter in separate flocks of not more than two or three hundred each. When the pasturage in one section of the ranch is closely cropped, they should be driven to another, and so on to different localities in rotation, to constantly

secure fresh grazing grounds. It is desirable to have sheds in winter as a protection against severe storms. A large percentage of sheep in many of the ranches are owned by persons who do not manage them themselves, but who take, as an associate, a man of integrity and experience in the business, but destitute of capital, to whom the entire charge of the flock is given, and for his services the usual allowance is one-half the increase of the flock. While many make a remarkable success in this business, others meet with reverses, as will be seen by the following from one of our leading journals:

"To illustrate what can be really done with sheep in Montana, the experience of 'Judge Davenport' is related. Four years ago last July, the Judge bought 1,000 ewes, which cost him in the neighborhood of \$3,000. These he put in charge of a young man, who was to take them on a range, care for them, pay all the expenses of the band, and to receive as his share one-half of the wool produced and one-half the increase of the flock. At the end of four years a settlement was to be made, and Judge Davenport was then to receive back 1,000 of the best ewes which the band contained. The settlement was made last July. In the meantime Judge Davenport had received for his share of the proceeds of the wool, \$6,500, and for his share of the increase, \$8,000. The profits of his investment of \$3,000 for four years were, therefore, \$14,500, or \$3,625 or 121 $\frac{2}{3}$  per cent. a year!

During the same year other men made only 50 or 60 per cent. on their sheep, and some, who, from inexperience or bad fortune met with heavy losses, perhaps not more than 25 per cent. Absolute losses, it is said, are very rare if a man sticks to the business for a period of three or four years. In illustration of this the case of one man who, driving a large band of sheep from the South a year or two ago, was caught by the winter in an unfavorable place, and lost one-half or two-thirds of his flock, is cited. This unfortunate individual at the end of three years, when he came to balance his books, found that the remnant of his band had done so well that his profits had been about 25 per cent. a year on his original investment."

Life on the Colorado sheep ranches is thus described by a correspondent of one of our leading agricultural journals:—

"There is a novelty and charm about this life which attract very many from the older States, and one is constantly discovering in the rough herder's garb men of education and culture. They are fond of the freedom and exhilaration of this mode of existence, which also promises health, wealth, and adventure. Very many of the herders or hired men are fresh from college; youths who are serving their apprenticeship in the occupation of sheep-raising. Others come here from the Eastern and Middle States to engage in mining operations. They are unsuccessful, become straightened for money, and take to herding because herders are in demand. Their wages vary from fifteen to thirty dollars a month and board, according to capacity and experience. Many not only remain with their sheep during the day, but sleep near them in the corrals at night, as a protection against wolves. On three successive nights since we have been here, these wolves have made a descent upon the corral, killing several lambs. In the early days of Colorado sheep-raising, the herders were accustomed to camp with their flocks wherever night overtook them. This, however, was found to be a dangerous practice, inasmuch as the sudden storms of the Colorado plains would blind and scatter the sheep, and often lead to great loss. Sheep invariably go before a storm. Sometimes they cannot be checked, but will push on to certain destruction. We recall one instance where three thousand sheep in southern Colorado, overtaken at night, by a sudden storm, blindly followed their leader over a precipice, and perished in the waters below, not one escaping. Now the ranchmen have their sheep corralled at sunset, instead of keeping them out on the plains. Though generally manifesting but little intelligence, they invariably display much sagacity in wending their way toward the corral, which they know will afford them protection against wolves, and keep them warm and comfortable. The sheep soon come to know the herders, and manifest as much affection for them as sheep are capable of. It is not well, however, to have them become too tame, because they hang back and do not drive

well. The thrifty owner has his sheep out of the corral and upon the plains by daylight. They feed until about ten o'clock, and then bunch up, or form a compact mass, until four o'clock, and from then they feed until driven in at dark. They eat gramma, buffalo, wire, and bunch grass. Wild hay is cut and stacked for feeding in winter, so that they may not want for food should there be a heavy fall of snow. The herders generally have horses of their own, which subsist on prairie grass, are very much attached to their owners, and become wonderfully skilled in managing sheep. Give them the rein and they will gather in and keep the flock together with as much dexterity as the shepherd's dog who accompanies them. The dog is an essential part of the outfit, being a companion to his owner, and exercising a constant vigilance for the safety of the flock. Herder, horse, dog, and sheep together make a very picturesque appearance as they move over the plains.

The flocks, comprising Mexican sheep and their increase from Merino bucks, generally number from 1,000 to 3,000. During the winter the larger flocks are generally divided in order to insure better feeding and better protection. One herder can readily manage 2,500 sheep, but he has to have his wits about him constantly. The leader of the flock is generally a Mexican goat, whose prowess is recognized by the whole herd, and whose prominent figure enables him to be easily seen both by the sheep and the herder. The leader in the ranch we visited was the famous stag 'Christo.' This venerable goat has a history. He was brought from New Mexico many years ago, has been a leader for several different flocks, and now in his old age, though so decrepit as to travel at times with difficulty, has no idea of surrendering his leadership, but is invariably found at the front when necessary. The whole expression of his countenance, his dignified bearing, even his walk and the firm manner in which he plants his front feet, indicate that he realizes his responsibility and feels his importance. Old Christo shows an intelligence at times which is little less than human. For example, he snuffs the approach of wolves from afar, and often, when the unsuspecting sheep and lambs about him are sleeping in fancied security, he wakes the ranchman to make known the approach of the enemy. When no herders were sleeping with the sheep, he has recently, upon two occasions, taken the entire flock around the ranchman's house in the middle of the night to arouse him and secure protection from the advancing wolves. Christo, who is twenty-four years of age, will probably be gathered to his fathers soon, and he has so strong a hold upon the affections of his present owner that he will be buried with due honors.

The Mexican sheep, as a general thing, are purchased about the first of October. The bucks are turned in with them in December, and the lambing season begins about the middle of May. Shearing begins about the first of June. The Mexican sheep shear from two to four pounds, and improved sheep from four to eight pounds. Of course there are exceptions; for example:—The Willard Brothers, at their shearing match last year, clipped thirty-two and one half pounds of wool from one Vermont ram, which brought twenty cents a pound. In shearing sheep great care must be exercised not to begin too early, on account of late storms. The shearers are paid from five to eight cents a sheep for their work. One man can shear from twenty to seventy sheep in a day. Mexican wool brought last year from sixteen to twenty cents a pound (prices were much less this year), according to the absence or presence of 'kemp,' a hairy, valueless substance. As sheep improve, the quantity of kemp gradually diminishes. The fleece of the native Mexican sheep is a coarse carpet wool, but as the flocks are improved by the introduction of Merino bucks the quality of the wool is improved, until many of the ranchmen now claim that it is fully as good as that grown in the Eastern States. They further maintain that when their improved sheep become disassociated in the public mind from the native Mexicans, their wool will justly command as good a price as is paid for Eastern fleece. Owing to the scarcity of water, sheep are rarely washed in Colorado."

There are many attractions in the wild life of the ranchmen, and but few prettier sights are

presented to his vision than those represented by the various groupings and gambols of the young lambs ranging from two to six weeks old, in flocks of from two hundred to three hundred each. A recent writer gives the following graphic description of such scenes:—

"With the true gregarious instinct of their species, they range in flocks, or gangs, and are fuller of life, animation, agility, and grace than any mortal thing on earth. To see a snow-white squadron, two or three hundred strong, suddenly make a dash from a state of repose, and scamper, like mad race-horses, along the edge of a precipitous bluff, until the mad gallop of their twinkling feet is lost in the distance—perhaps a good half-mile away—and the green herder rises from his couch on the green grass, and girds up his loins preparatory to going after the runaway rascals—when, presto! here they come again, leaping, and glancing, and darting, and stamping, right back to the place from which they started, and suddenly stop, and look, with wonderful, inquiring eyes, upon the astonished herder; and, before he knows what to make of it, are off on the same 'racket' again, kicking and flinging and capering and pushing each other to the edge of the bluff, which, however, they are far too well posted to fall over. There may be prettier sights in the animal world, but we have yet to see them. Then how they stretch themselves upon the grass and lie in the warm rays of the life-giving sun, sleep till they get tired of sleeping, and then make a break for suction, dividing their time, like good, natural infants, between the two great props of physical existence, sleeping and eating; while their mothers—good, staid, sober, honest souls—forgetting, perhaps, that they were once lambs themselves—crop, contentedly and assiduously, the juicy pastures, and keep strictly to the real business of life—their life—viz., converting as much as possible of the vegetable world into mutton for the use of somebody else—a worthless coyote, or a worthless man; but yet recognizing the grand fact that their children are about, and not getting too far away, as they would be prone to do under other circumstances."

The largest flocks of sheep in the world are to be found in Australia, some individuals there owning more than half a million sheep. The flock of Mr. Robert Campbell, residing there, numbers 300,000; another owned by a private firm consists of 200,000, while flocks numbering from 50,000 to 80,000 owned by single individuals are not uncommon. The figures given above are from the published official tax-lists of Australia.

**Wool Eating.**—This pernicious habit is occasionally seen in individuals of a flock, and if not checked in proper time will be liable to extend to large numbers, and sometimes by its effects upon the stomach results in the loss of animals; it is also an injury to the fleece of the flock. It does not seem to be affected by medical treatment, and cannot be really treated as a disease. It appears generally to begin with a single animal, and gradually spreads by way of imitation. The usually sure method of stopping it is to early remove all such offenders and keep them in entire isolation until they forget the practice, or if all other means fail convert them into mutton. Where a valuable sheep that the owner is unwilling to lose is addicted to this habit, it will pay the trouble of a few weeks isolation, rather than killing the animal. Sheep will sometimes form the habit of wool eating when out in a severe snow storm where food is scarce, and will continue it afterward when they have an abundance. The following remedy is given by an experienced wool grower in Colorado as generally effectual in curing the evil. Mix together equal parts of powdered chalk and common salt, and place a liberal quantity in different places on boards or in troughs in the sheep pen where they can have free access to it, and in about two weeks the habit will be abandoned. We have never tried this remedy ourselves, and therefore cannot vouch for its value, but presume it may prove efficacious in many instances. A mixture of cayenne pepper and lard applied to the wool is also a good remedy, since, having tasted it once, they rarely prefer a second dose.

**Cotted Wool and its Causes.**—It sometimes happens that an occasional fleece in a flock will become more or less cotted, often to the extent as to be nearly or quite worthless. This condition may be due to several causes. If sheep are too much exposed to the storms or inclemency of the weather, and allowed to lie in damp places, are poorly fed, or otherwise

ill treated to the extent that their general health suffers, the skin will of course participate in the evil effects of the imperfect nourishment of the body; hence, the wool will be supplied with a less amount of the liquids from which it derives the elements of growth, and receiving less of the oily secretion, called yolk, from the minute glands that supply it, withers, becomes hard and dry, loses its softness and elasticity, and becomes matted into inextricable masses, while on the backs of the sheep. If there is any tendency to scab or skin eruptions, the difficulty will of course become greatly aggravated. The only remedy for this difficulty is to keep the sheep in good condition by observing the sanitary laws necessary to that result. Good food in sufficient quantities, plenty of pure air and water, clean, dry yards, and a warm, dry place to sleep at night in winter, and dry land for pasturage in summer are the essentials. No sheep can be healthy where the soil is so damp that the hoofs are constantly wet. To avoid the coting of fleece, therefore, implies the avoidance of all the causes of disease and lack of thrift in a flock, since by good care and perfect health the fleece will receive from the sebaceous glands which secrete the yolk a sufficient supply of that element to render the wool soft and elastic, and its coting impossible. When the wool has become cotted, it will generally be found impossible to restore it, but by improving the general system and skin of the animal the future growth will become natural and strong.

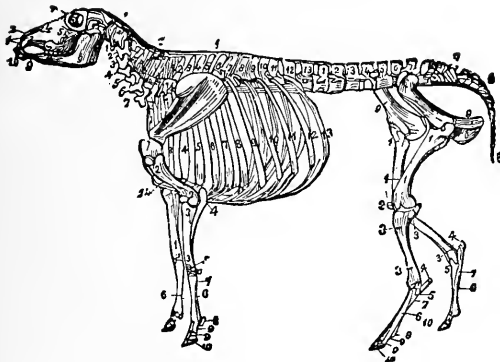
**Skeleton of the Sheep.**—The following explanation will be found of value in giving the location and names of the bones of the sheep:

Beginning with the head, the references to cut of skeleton show: 1—The intermaxillary bone. 2—The nasal bones. 3—The upper jaw. 4—The union of the nasal and upper jaw bone. 5—The union of the molar and lachrymal bones. 6—The orbits of the eye. 7—The frontal bone. 9—The lower jaw. 10—The incisor teeth or nippers. 11—The molars or grinders.

**THE NECK AND BODY.**—1, 1—The ligament of the neck, supporting the head. 1, 2, 3, 4, 5, 6, 7

—The seven vertebrae, or bones of the neck. 1-13—The thirteen vertebrae, or bones of the back. 1-6—The six vertebrae of the loins. 7—The sacral bone. 8—The bones of the tail, varying in different breeds from twelve to twenty-one. 9—The haunch and pelvis. 1-8—The eight true ribs with their cartilages. 9-13—The five false ribs, or those that are not attached to the breast bone. 14—The breast bone.

**THE FORE LEG.**—1—The scapula or shoulder-blade. 2—The humerus, bone of the arm, or lower part of the shoulder. 3—The radius, or bone of the forearm. 4—The ulna, or elbow. 5—The knee, with its different bones. 6—The metacarpal or



SKELETON OF LEICESTERSHIRE SHEEP.

shank-bones; the larger bones of the leg. 7—A rudiment of the smaller metacarpal. 8—One of the sesamoid bones. 9—The two first bones of the foot; the pasterns. 10—The proper bones of the foot.

**THE HIND LEG.**—1—The Thigh bone. 2—The stifle joint and its bone, the patella. 3—The tibia, or bone of the upper part of the leg. 4—The point of the hock. 5—The other bones of the hock. 6—The metatarsal bone, or bone of the hind leg. 7—Rudiment of the small metatarsal. 8—A sesamoid bone. 9—The first two bones of the foot, the pasterns. 10—The proper bone of the foot.

It will be seen that the general anatomy of the sheep corresponds to that of the ox. In the limbs we find the number of joints the same in the horse, ox, and sheep. Beneath the fetlock, however, the four bones are doubled in the sheep.

## DISEASES OF SHEEP.

**S**HEEP are naturally healthy, and except under conditions of culpable neglect, diseases rarely occur spontaneously; hence, sheep that are properly cared for have but few diseases, while those that suffer neglect and abuse, are liable to many. The sheep is an inhabitant of every climate from the torrid to the frigid zone, and seems to readily adapt itself to every country and temperature.

It is stated by good authority that the digestive system of the sheep is the most powerful of all domestic animals; they are also naturally among the most healthy, and we are well satisfied that there need be but little sickness in any flock, if the proper means of prevention are observed. The old adage that "an ounce of prevention is worth a pound of cure," is admirably applicable in maintaining a flock of sheep in a healthy condition. As a rule, we do not believe in the practice of dosing animals.

The two most prevalent, as well as most dreaded maladies to which the flocks of our country are most exposed, are foot-rot and scab. One sheep infected with either of these diseases is liable to endanger all the others by contagion; consequently, the only safety for them is in excluding from the pastures, yards, pens, paths, and the vicinity even if possible, all the ailing members of the flock. A poor and unthrifty condition is highly conducive to the contraction and spread of disease among sheep, and such a flock is more difficult to successfully treat in its extermination, since a well fed, vigorous sheep possesses more vitality and power to counteract and throw off disease, than one ill cared for, and the flock-master who provides for his sheep best in health, has fewest losses from maladies of any kind.

We would also impress upon the mind of every flock owner, the importance of separating all ailing sheep from the well ones, and maintaining this isolation until the animals are completely cured. Valuable flocks have no doubt been often lost through neglect of this very essential practice.

Proper care consists in sufficient and nutritious food, plenty of pure water and air, salt at least once a week, dry grounds, not overcrowded at any season, well ventilated and dry sheds in winter, and protection from the cold fall and spring rains.

**Abortion.**—Although abortion can scarcely be called a disease, still measures can be taken for its prevention which should be known to the farmer, since when it has taken place once, it is more liable to occur a second and subsequent times; and to avoid this tendency in the animal, it should carefully be guarded against at all times as far as possible. Young ewes are especially liable to this tendency, and it often results from their being crowded by the older and stronger sheep; it is therefore well to keep the ewes that are in lamb for the first time in a flock by themselves, where this injurious crowding will be avoided; for it is a noticeable fact that with all animals, even the gentle and naturally peaceable sheep, the stronger will domineer over the weaker, greatly to the disadvantage of the latter.

Aborting is also often due to an overfeed of cold, succulent food, stabling without food, and turning to frozen grass when hungry; being chased or pushed about by other animals; slipping on the ice; stabling without water, and then turning them where they can gorge themselves with ice-water; constipation of the bowels, often produced by too sudden a change from pasture to hay; green to dry food will also cause it. By observing previous directions given in these pages relative to the management of sheep, these causes of aborting may be avoided, and the number of lambs largely increased in the flock.

**Brain Disease.**—This is by no means an uncommon disease in flocks, but it usually occurs in isolated cases. The symptoms are, loss of appetite, with hanging of the head, the eyes glazed and watery, the animal looking stupid, and often, to all appearance, nearly blind.

It will run against obstacles, sometimes pressing against them with the head for some time. Some attribute this disease to the exciting effects of feeding too much corn.

Feeding with bran and roots for a time, with good hay, may remedy the trouble; also  $1\frac{1}{2}$  ounces of sulphate of magnesia, repeated after two days. The dose should be dissolved in a little water and turned down the animal. If taken before the disease is far advanced, this will usually prove an effectual remedy, but the recovery from this disease will always be gradual. Constipation should be avoided.

**Catarrh.**—This is another term for cold in the head, and is caused by taking cold in various ways, such as exposure to storms (cold rains being the worst), getting chilled after running, being in a strong draft of cold air, lying on the wet ground, etc. It consists of an inflammation of the mucus membrane of the nostrils and windpipe, and in the acute form often extends to the lungs, which constitutes lung fever, when they will often die notwithstanding the care that may be bestowed upon them. Sometimes they will gradually lose their vitality, waste away, and drop off before spring. With this, as with most other diseases, the prevention is more easy than the cure. Take good care of your flock and they will not contract the disease.

A good remedy for catarrh is to smear the noses of the sheep with tar, using only that which is good and fresh, and also put some along the bottom of the trough in which their grain is fed to them. By scattering their grain over the tar they will lick up some of it in eating the grain. Particular attention should always be given to keeping the flock under cover during rainy weather, and in keeping their stables and sheds well ventilated at all times.

Another very good remedy is to take equal parts of pulverized rosin, flowers of sulphur, and salt, and cover the bottoms of their feeding troughs with it. The sticky nature of the rosin, combined with the moisture of the salt, causes the sulphur to adhere to the noses of the sheep, and sulphur is one of the best remedies for catarrh. In this way they will get a direct application to the nose every time they eat.

Sulphur, mixed with salt, in the proportion of five pounds of salt to one of sulphur, is considered a good remedy by many flock-masters. It should be placed in their feeding-troughs, or places where they can have easy access to it. Some sheep-owners give their well flocks this mixture every week or two.

Sulphur has many valuable properties that recommend its use to keepers of sheep. It is a mild laxative, and valuable for use in hemorrhoids or piles. It induces perspiration, and passes readily through the pores of the skin, and is also an exterminator of parasites.

In severe cases a dose of podophylin as a physic, followed by a mild dose of cinchonia every three hours afterwards until five of the latter doses are taken, will usually prove beneficial. This can be repeated the following day, if necessary. The dose for a sheep is twice the quantity required for a man. The podophylin acts directly upon the liver, and equalizes the circulation.

**Choking.**—When obstructions lodge in the throat which the animal is unable to dislodge, a little olive oil or melted lard turned down will usually enable a person to move the obstruction up or down with the hand from the outside. (See directions for this difficulty in the Cattle department.)

**Colic.**—This is usually very violent and distressing; the animal having at intervals paroxysms of severe pain. It will stretch itself, groan, twist its head, and frequently get up and lie down again. It is generally caused by drinking a large quantity of cold water when heated; improper food, etc.; and is sometimes the result of constipation produced by the animal's being confined exclusively to dry food for some time. Unless relief is soon obtained it often results in the loss of the animal.

Give, as soon as possible, an ounce of epsom salts, dissolved with warm water, mixed with an even tablespoonful of ginger (in powder), and a teaspoonful of the essence of peppermint. A dose of the salts alone will often effect a cure; so will also a good dose of castor or linseed oil, or even melted lard; but the first prescription recommended is to be preferred. For a half-grown lamb one-half this dose will be sufficient.

**Diarrhea.**—This is frequently induced by taking cold, or by the general derangement of the digestive organs, caused by improper food. It is also frequently caused by a sudden change of food, such as from dry hay and grain to grass. Sometimes a change to dry food for a time, followed by a gradual change to grass, will remedy the evil. Lambs are more liable to this trouble than sheep, and it more frequently proves fatal with them than with the latter.

For lambs, especially if mucus is passed with the evacuations, a gentle cathartic is advised, such as a half drachm of rhubarb, or an ounce of linseed or castor oil, or a half ounce of epsom salts, either of which are good for the purpose. After the physic has taken effect, follow it immediately with one-fourth of an ounce of prepared chalk in half a pint of warm milk. This will usually effect a cure, but if it does not, repeat it once a day for two or three days.

Some sheep-owners use a little ginger or essence of peppermint mixed with the chalk preparation; a half teaspoonful of each would be sufficient for a half-grown lamb.

**Dysentery.**—This disease differs from diarrhea, as it is accompanied with fever, and the evacuations are bloody and offensive; there is also loss of appetite. We would recommend first, a couple of doses of the linseed or castor oil (of one ounce each), the one to be taken at morning, the other at night, which in a few hours will be followed by one-half an ounce of prepared chalk in a half pint of warm milk, adding from twenty to thirty drops of laudanum, and the same of Jamaica ginger, or a teaspoonful of ginger in powder. If checked too suddenly, a fever or inflammation of the bowels will be the result. One-half of the above will be an ample dose for a half-grown lamb; if younger, the dose should be proportioned accordingly.

**Garget.**—This usually occurs from the ewe either losing her lamb, or when the udder has not been properly relieved of milk by the lamb. Whenever there is a tendency to inflammation of the udder from loss of lamb, the ewe may be suckled by another lamb, or milked a few times, never taking quite all of the milk, and increasing the intervals between milking. The udder will usually, with this treatment, become soft in a few days. A few doses of saltpetre of about twenty grains each will assist by exciting the action of the kidneys.

Bathing the udder in cold water is also a good remedy when much soreness and inflammation exists. If there are any feverish symptoms, a dose of epsom salts (one ounce) will generally give relief.

**Grub in the Head.**—The bot fly of the sheep does not deposit its eggs in the locality of the animal chosen by the bot fly of the horse or ox for this purpose; the bot of the horse being usually found in his stomach; that of the ox beneath the skin on the back and quarters.

The bot-fly of the sheep (*Oestrus ovis*), sometimes called the gad-fly, lays her eggs about the nasal opening, and the larvae or young at once make their way up the nostril and finally reach the cranial sinuses, where they attach themselves by means of two little hooks growing out of their heads; they remain in this manner until they become full-grown larvae, when they again make a passage by way of the nostrils, down from the head, and penetrate the loose soil, if they chance to drop upon the ground where the soil is sufficiently porous to admit them. They remain in the ground, going through a series of changes similar to the bot of the horse or ox, and after a few weeks emerge from the ground a young bot-fly. It can readily

be seen how the larvae of the sheep bot can, by its traveling about and attaching itself to the delicate and sensitive membrane of the sinuses, create a vast deal of irritation and suffering, and not unfrequently sufficient to cause the death of the animal.

A sheep-owner informed the writer that not long since he lost a fine-blooded ram from this difficulty. A post mortem-examination resulted in finding two large grubs or worms in the head of the dead animal; one somewhat larger than the other, the larger being over half an inch long. They were quite tough, and when he attempted to divide them with a hard piece of wood, he failed and was obliged to use a pocket-knife to accomplish it. When sheep are attacked by this fly, they will crowd together, keeping their heads down near the ground, or if alone will push the nose against the ground in order to prevent them from alighting near it. Prevention, with this, as well as other ills, is the best course to pursue, and is commonly accomplished by tarring the nose of the sheep.

Some sheep-owners, in addition to this precaution, provide a dark house in the pasture into which the sheep can run when attacked by the fly that deposits the eggs, as the fly will not enter a dark place, and the sheep will instinctively seek it as a protection, and will come out to graze toward evening, after the flies have disappeared. Bromo-chloralum mixed with an equal quantity of water injected into the nostril is used with good effect by many sheep-owners. It should be injected until it brings out the larvae. Plowing furrows in the pasture where the sheep are kept occasionally in July and August, the time when the fly deposits its eggs, is often practiced; this gives the sheep an opportunity to bury their noses in the mellow earth whenever the fly attacks them, and thus prevent the deposit. Some say that the larvae are sometimes dislodged by blowing tobacco smoke through the stem of a pipe into the nostril. This can be done by covering the bowl of the pipe with a cloth, and forcing the smoke through the stem.

**Hoof-Rot.**—This is one of the most contagious and troublesome diseases with which sheep are affected, a single sheep often ruining an entire flock. It is most common with sheep that are kept on wet lands. The disease attacks the foot where the hoof unites with the bony structure and in the cleft between the hoofs. If not given prompt attention, it suppurates, the whole hoof is at length involved, and becomes so painful that the poor creatures sometimes hobble about on their knees; finally the hoof comes off, and the sheep are lost. Maggots sometimes infest the hoof before this stage is reached. This disease is supposed to be caused by an undue amount of moisture under the feet of the animals which softens the hoof, causes an inflammation and a consequent decay of the tissue. Dr. J. N. Navin, in an address before the Indiana Wool Growers Association, gives the following explanation of the cause of this disease:

“Between the hoofs of the sheep a small aperture may be seen, called the biflex canal, whose office it is to secrete an oily fluid for the purpose of lubricating the hide between the hoofs, it being called into action by every step the sheep takes in providing its food; therefore when perpetually wet or constantly dirty the parts swell, and this secretion already spoken of is stopped or retarded, therefore not only is the hide deprived of the oily secretion, but the secretion itself becomes an irritant of the glands which secreted it; therefore inflammation of the parts is the consequent result, hence foot rot, which, unless retarded and remedied very soon, destroys not only the hoofs, but the glands, and perhaps the coronary border which secretes the hoofs.”

The first symptom of this disease is a lameness in the foot, and if properly attended to in the first stages can be cured. There are various remedies; but the first thing necessary is to remove them to dry pastures so that the remedies may prove more effectual by adhering to the feet. Before applying any wash, the dry or dead parts of the hoof should be pared off. This should be done by a sharp knife carefully, and by a skillful and experienced operator. No more of the hoof should be cut than absolutely necessary to remove what

covers the diseased portions of the feet, and if properly done, no bleeding will result from the operation. An unskillful, careless operator may do more damage in cutting than the disease, and it should be borne in mind that what is necessary at this point is skillful surgery, not butchery.

Various applications are recommended by experienced wool-growers. A gentleman of large experience in sheep-rearing in Australia, states that he has never found anything equal in its good effect to the arsenic trough. The trough should be large enough to hold two or three sheep standing, and the solution contain three ounces of arsenic to a gallon of water, and about an ounce of salt. It should be as hot as one could bear the hand for an instant, and three or four inches in depth in the trough, just deep enough to well cover the hoof. The sheep should be required to stand four or five minutes in this bath, by being held by the head, keeping two or three sheep in at a time; in this manner two or three persons can run through a large flock in a comparatively short time.

The wash should be kept quite warm by repeated additions, or dropping a hot iron into it. The arsenic hardens the hoof, and not only destroys the germ of the disease, but acts as an antiseptic. Fine, dry weather is necessary to the operation. He also says that if sheep are put through the arsenic bath every three months, lameness will be a rare exception in any flock.

Another wash highly recommended by good authority, is a solution of blue vitriol and water as hot as the hand can endure for an instant, twelve pounds of vitriol being sufficient for a hundred sheep. The bath should be sufficient to well cover the hoof, the hoofs of the animals having been first pared according to the above directions. The hot liquid quickly penetrates to every cavity of the foot, and will produce more marked results than merely wetting. The animals should stand in it from eight to ten minutes. Another method sometimes resorted to is to pare the hoof as in case of the wash, and smear the foot with a mixture of the following proportions: powdered blue vitriol one pound; verdigris one-half pound; linseed oil one pint; pure tar one pint. This preparation will stick to the foot, and is a very effectual remedy; however, we do not recommend it as superior to the above hoof baths. After treatment of any kind, the sheep should be kept on a dry footing, and if on a floor, a little lime sprinkled on it acts as a preventive.

This dreadful disease is said to be more prevalent among Merino sheep than with the long-wooled breeds, owing in part to the difference in the formation of the hoof. Whenever it makes its appearance, it should receive attention at once, as it will be liable to spread through the flock in a short time. Feeding on the same pasture, lying in the same yard, or being driven over the same road with the flocks, or soon after a flock infected with it has passed, will often fasten this disease upon a large portion of the animals thus exposed, as it is very contagious. All sheep showing any sign of it should be at once separated from the well ones, and after an infected flock has been cured, they should not occupy the same grounds for, at least, four or five weeks. In fact, no diseased sheep of any kind should ever be tolerated in a flock, for they are very unprofitable. Inexperienced persons, in buying sheep, should be exceedingly careful, and give special examination before making a purchase, to see that the animals are all perfectly sound. Should there be a single lame one in the flock, especially if the lameness be in the foot, it may be pretty safely depended upon that it has this terrible disease, either in its incipient or more advanced stages.

**Hoven.**—This difficulty is caused by the vegetable matter in the first stomach becoming fermented, and such a quantity of gas in consequence generated that the sheep swells nearly to bursting, and death sometimes ensues from suffocation. Hoven is quite common when sheep are first turned into a rich pasture; especially clover.

The breathing is short, owing to the distended condition of the stomach, which leaves but little room for respiration, and the body of the sheep is largely distended, especially the left side.

If the fermentation of the contents of the stomach can be checked, relief will soon follow. By driving the sheep gently about for a time will sometimes relieve the difficulty; but a surer remedy is to give a full teaspoonful of spirits of ammonia in a half-pint of water, to be soon followed by a dose of an ounce of epsom salts to relieve the system. This will generally prove effective. Carbonate of soda, such as housekeepers use for cooking purposes, is a good substitute when ammonia cannot be procured; it should be given in doses of two-thirds of a tablespoonful dissolved in a little water, every half-hour until the animal is relieved. A little lime water will sometimes answer the purpose.

As a last resort, when all other remedies fail, it will sometimes be necessary to puncture the side to penetrate the stomach and let out the gas. This is best done with a trocar, an instrument sometimes used by doctors in cases of dropsy. This permits the gas to escape, but prevents the escape of the contents of the stomach into the abdominal cavity, which would produce serious inflammation. This is inserted into the stomach at a point half way between the haunch-bone and the last rib, and near the backbone. This operation is attended with danger, but most animals will recover from it.

When no trocar is to be obtained, a sharp-pointed pocket-knife is sometimes used, and a tube inserted to emit the gas and prevent the escape of the stomach contents. The tube should be removed when the superfluous gas and other matter have ceased to escape.

**Liver Rot.**—This disease scarcely ever appears in this country, being confined mostly to English sheep. It is generally considered incurable, though not contagious. It has its origin in the liver, and subsequently extends to the lungs, kidneys, and the entire cellular system; the abdomen becomes at length filled with a greenish-colored water or serum, and the disease is sometimes mistaken for the dropsy. The symptoms are dullness, a bluish color of the skin, a little fullness under the jaws, diarrhea, and thirst; thirst, however, being the most noticeable symptom.

This disease, or consumption of the liver, is caused by one of the worst of parasites,—a small fluke-worm, which gets into the liver in a manner similar to trichinae in pork. It is supposed that this disease results from sheep feeding on low, wet, or marshy lands, such as are subject to an overflow at certain seasons.

It is thought by some writers on this subject that the little insects found in the biliary duct and gall bladder are taken up by the sheep off the grass after the ground dries up, and are passed into the liver through the absorbents or lacteals of the bowels. The mutton is said not to be affected until after the destruction of the liver commences; hence, as there is no known remedy to effect a complete cure, English farmers prepare their animals for the butcher (if not already in condition, which they usually are,) as soon as the first symptoms appear, and thus avoid the loss that would otherwise be sustained.

**Maggot fly.**—Flies are a great annoyance to sheep in warm weather. They not only deposit their eggs in or near the nostril, causing the disease known as grub in the head, but also among the wool, which, when hatched, the maggot eats into the skin, making sore places, which invite an increase of the difficulty.

The sheep thus affected will become restless and uneasy, rubbing themselves against every obstacle, and will sometimes droop and die, if not relieved of the pests by proper attention. An application of tar, with spirits of turpentine, well mixed together, when applied to the parts affected, and about the ears and tail, will generally remove the difficulty. A mixture of sulphur and lard, with a little spirits of turpentine added, is also a good remedy, when applied to the parts affected.

The backs of long-wooled sheep, by being more exposed, from the open nature of the fleece, are more liable to this difficulty than those breeds having short, thick fleeces.

Wounds of any kind on sheep are liable to the deposit of the eggs of the maggot fly, and should be smeared over with a coating of tar at once to prevent the trouble.

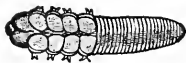
**Ophthalmia.**—This is an inflammation of the eye, sometimes resulting in a cataract or total blindness. Before resorting to any special treatment, the discharge should be removed from the lids by a small soft sponge and warm water; after which examine the eyelids to ascertain if any foreign substance, such as hay seed or bits of straw, are the cause of the difficulty. If so, carefully remove the foreign substance and bathe the eye-lids with weak salt and water, at the rate of a teaspoonful to half a pint of warm water. Repeat this twice a day until the difficulty is removed. Sometimes a little sulphate of zinc and laudanum added to the water will relieve the difficulty. By placing the animal alone in a dark stable, the eye is in a measure relieved, since a strong light is injurious to the eyes where any degree of inflammation exists.

**Poison.**—Sheep and lambs are frequently poisoned by eating weeds or shrubs of a poisonous nature, growing in their pastures, the most common of which are both the narrow and broad-leaved laurel or "ivy," as it is called in many sections. St. John's Wort will also poison sheep badly and cause sore lips and face. After eating poisonous herbage sheep will appear dull and stupid, the body will distend a little, and there will generally be a frothy, greenish substance about the mouth; the animal will gulp a greenish fluid, which it will swallow in part, and a part will run out of the mouth and discolor the lips. The usual remedy is to give a good dose of castor oil and milk, in order to free the system of the poison as soon as possible, but this requires considerable time for operation, and permits the poison to be distributed through the system.

Six ounces of sweet-oil, or a half pint of linseed oil, is a good substitute for the castor oil. The use of the stomach pump as soon as the case is detected, and thus dilute the poison with water and extract it immediately from the stomach, is the best course to pursue in such cases. Mr. Morrell advises, in his work on sheep, the use of a gag placed in the mouth, by which means all the greenish fluid, which, in the early stages of poisoning is thrown up from the stomach, can escape from the mouth instead of being swallowed again by the animal. The gag advised is about six inches long, and of the size of the wrist of an ordinary person. It should be placed in the mouth, and a string tied at one end, passed over the head and tied to the other end, in order to hold it in the mouth. The fluid will then run from the mouth as fast as thrown up from the stomach. In addition to this he advises giving roasted onions and sweetened milk freely. Give all the salt that the animal will eat at such times.

When the face and lips are sore from the poison of St. John's Wort, bathe with a solution of salt and water, and afterward apply sulphur and lard, with a little tar well mixed. For sore mouth smear the lips well with tar, and allow the sheep to eat a little of it if they will.

**Scab.**—This is one of the greatest scourges known to sheep, being very contagious, as well as obstinate, causing a vast amount of annoyance and pain, and if not arrested in time, will result in death. There is also great loss sustained by the destruction of the wool, when this disease becomes well-established in a flock. It is caused by a very small insect, called the acarus (of which there are several varieties), which burrows in the skin and hatches its young there, the new generation coming out only to burrow and extend the hatching territory, and thus the process is repeated *ad infinitum*, until, if unchecked, the entire skin of the animal becomes involved. It is a disease similar to "the itch" in man. The same parasite is also sometimes found in the sebaceous glands of the dog.



SCAB PARASITE.

The constant burrowing of this minute insect causes intense itching and pain, and the poor animal rubs and scratches against every obstacle, bites itself, and pulls out its wool, which only extends the mischief on its own body by making sores on which scabs will form, and soon communicate it to others, until finally an entire flock will be affected with it. After

the forming of the scabs the wool will generally begin to come off in patches, and, if uncured, the animal will lose appetite and pine away and die. The period of incubation or hatching of the eggs of this parasite varies according to surrounding circumstances, it greatly depending upon the temperature and moisture to which they are subjected. Various experiments have been tried to ascertain the length of time required for this purpose, as well as the time that they will retain their vitality and finally hatch under favoring circumstances; but it has not yet been fully demonstrated. An authentic writer says respecting this subject:

"How long such eggs may be preserved without losing their vitality, is a question of supreme importance to the live stock interests, inasmuch as the dangers from infested buildings, clothing, harness, combs, brushes, rubbing posts, and lairs can only be limited by the period of viability of the eggs. Unfortunately this limit has not yet been definitely ascertained, though the analogy with the eggs of worms, and even of the higher animals, would suggest that vitality be retained for months in favorable circumstances. Hence, in a sheep-run full of bushes, stumps, and stones that have been used as rubbing-posts by the scabby flock, the only safety consists in a prolonged absence of the ovine race, and the grazing of such pastures by other animals on which the parasite which has infested this flock is incapable of surviving."

If the skin is examined in the early stages of the disease, it will be found to be covered with yellowish pimples and scurf, after which the scabs form around the roots of the wool and thicken until they finally raise the wool and draw its roots out of the skin. This is why, as the disease advances, bare patches occur on the skin, and the wool hangs in shreds.

In this disease, as well as most others, prevention is easier than the cure, and if animals are well cared for, having a sufficient supply of good hay, roots, and grain in winter, together with an easy access to pure water and salt, with good ventilation, warm, dry beds at night, and are not overcrowded, they will not be liable to contract it in that season; while sweet and abundant pasturage and other favoring conditions will not be liable to engender it in summer. Exposure to the hot sun, as well as exertion to cause perspiration, has a tendency to favor the activity and development of this pest; therefore a sheep pasture should always be supplied with shade to which the sheep can resort when they choose. Healthy, well-fed sheep are less liable to contract the disease than those weak and thin in flesh.

In the first place all the diseased sheep should be separated from the well ones. Before the disease has arrived at the stage where thick scabs have formed, the difficulty can be reached by applying anything that will kill the minute insect that causes the trouble; hence anything that will do this without injury to the sheep will cure the disease. Various remedies are used, but the most common one is the application of a strong decoction of tobacco. From five to six pounds of tobacco, or tobacco stumps, steeped in as many gallons of water until the strength is extracted, and then add enough water to make a bath of from twenty to twenty-five gallons, will usually accomplish the result.

It may be well to repeat this practice in a week or ten days to ensure a thorough cure, and that those insects which may have escaped the first application may receive the second, as tobacco will kill any insect with which it comes in contact. Some wool growers add a pound of blue vitrol to the above to every pound of tobacco; three pounds of either soft or hard soap, and a half pound of flowers of sulphur are also used with the mentioned quantity of tobacco.

When the scabs have become so formed on the surface that they require softening or breaking up in order to reach the little parasites beneath, and which often furnish them a secure shelter from external applications, a dressing of lard well rubbed into the skin is sometimes used, followed with a good wash with strong soap suds, after which the dressing may be applied for the destruction of the insects. It often becomes necessary to shear off some of the wool in order to make thorough work in exterminating them. The sheep should

remain at least three minutes in the bath (which should be warm), that every part of the skin may become wet with this wash, after which the wool should be squeezed to take out the surplus water. They should be dipped according to directions given for dipping for killing ticks.

An arsenic bath is often employed with good effect, but its use is attended with considerable danger, for if the bathed sheep are turned out into a pasture, and a rain storm comes up, the arsenic will be liable to be washed from their fleeces upon the ground, and be afterwards eaten, which may poison large numbers of the flock; besides, sheep will sometimes lick each others' fleeces and may obtain the poison in that manner. If left in a tank where any bird or animal can have access to it, they are liable to drink it, since arsenic is tasteless, and if poured upon the ground it is liable to filter into a well and do injury in this manner, while if burned, it is still more dangerous, as it is condensed from the air on surrounding vegetation, and may act as a slow poison on the animals that may eat it.

Objections might also be urged against mercurial ointments, which are more slow in their effects in poisoning the acari than arsenic, and leave injurious results upon the animals thus treated, by absorption through the skin, among which are mercurial sore mouth, loss of teeth, premature old age, and poor condition generally. It is, however, used quite extensively in many portions of Great Britain. Tobacco, in proper quantity, is the safest, cheapest, and most easy of application of any remedy with which we are familiar, and is equally sure.

Many other remedies which are destructive to the acari, may be injurious to the wool, or exercise a deteriorating effect upon it. This may be said of the alkalies, potassa, soda, and their carbonates, which dry and wither the wool, stunting its growth and rendering it brittle, while tar, carbolic acid, and sulphate of iron, are said by good authority to not only dry the wool and render it brittle, but are liable to impart a permanent stain to it, which would be an injury to the better class of wools.

For dipping pregnant ewes, and very heavy sheep that require considerable care and labor in lifting, an inclined plane leading down into the dipping tank and another leading out of it, will be found a great convenience. The sheep can be held in the tank by the head a few minutes and the liquid washed up on to the head with the hands. Sheep should be dipped, if possible, in dry, pleasant weather, and kept in a yard until their fleeces are dry, and only fed from racks, for if fed from the ground they may be liable to be poisoned from the drippings of their fleeces. When the weather is too cold and severe for dipping, and only a limited number are slightly attacked, the diseased spots on the bodies of the sheep can be carefully searched out and readily detected, and an application of the remedy turned upon these parts of the animal from an old tea pot or dipper, and worked down through the wool to the skin with the hands, which practice will often prove successful in arresting the disease and accomplishing a complete cure.

In more advanced stages of the disease, of course, the more thorough practice of dipping will be necessitated. In all instances where scab has been known, great care must be taken to exclude diseased sheep from well ones, and also from their pastures for several weeks (some writers say three months), and to saturate every rubbing post, tree, stone, or place that could have been used by the diseased sheep for rubbing against, with some of the above-mentioned washes for exterminating the parasites, or with whitewash made of freshly-burned quick lime. The same precaution should be used relative to their yards and the straw from them that had been used for bedding while suffering from the disease. This should be burned up, and new bedding put in its place. It would be well, also, to plow up the yard, and thus throw up the clean, fresh soil. Too great precaution cannot be used to prevent the spreading of this pest. They should by all means be put in a fresh pasture. Cattle and horses can be pastured upon grounds previously grazed by affected sheep without danger, as the insect will not live upon them.

The following method of treatment and manner of constructing a dipping tank for use in exclusive sheep husbandry, is given by Mr. R. R. Wright, Jr., Secretary of the Rocky Mountain Wool Grower's Association, after ten years experience, and may be of interest to others extensively engaged in the wool growing enterprise:

"I take my sheep from the shearing-pen as they are sheared, and examine every one thoroughly; and when I find any signs of scab, I break the skin with a curry-comb until it bleeds. To this spot I apply spirits of tar with a paint brush (full strength), going through every lamb, as well as old sheep. After painting, I let them run ten days, then take them to my dipping apparatus, which consists of a tank, 35 feet long, 5 feet deep, and 18 inches wide. I dig a hole in the ground, brick it up, and cement the tank on the inside, with a large dripping pen, divided so that one pen will be dripping while I am filling the other. I have large tanks to soak and steep my tobacco in, which is done with a small-sized steam boiler, and have pipes running from my tank to the dipping vat; and in that way I can keep the dip the temperature I want it, which is about 120° (no hotter).

The dip that I have had the best success with (and I have used almost every dip known), is as follows: 30 lbs leaf tobacco, 8 lbs. sulphur, 1 lb. arsenic, and one quart spirits of tar, to every 100 gallons of water. I add the sulphur, arsenic, and spirits of tar to the tobacco mixture in the dipping vat. I let my tobacco soak for twelve hours (the longer the better), then boil it for two hours, keeping my tank covered, to keep the steam from escaping. My sheep that were painted with the spirits of tar, ten days before, are put in a large corral, to which is attached a small pen that will hold, say 200 sheep. These sheep are caught and thrown into the vat, head first, and made to swim the whole length of the tank, and come out in the dripping pens.

When they come to a sheep that has been painted, these spots are painted again, and any sheep that has it bad is held in the vat about a minute before it is allowed to swim through. As soon as the sheep are dipped they are taken to a new range, or to a portion of the old range where they have not been for some time, and put in clean corrals; they are held there twelve days, brought back, dipped the second time, and taken to another part of the range. Usually two dippings like the above, with the painting, will cure any ordinary case of scab; but if they are very bad it will take three. Every sheep must be examined and well dipped, for if you slight one that has the scab, you will never cure it.

The sheep ought not to be put back in the old corrals or old range for two months, and not then unless the corrals have been thoroughly cleansed and whitewashed, or there have been heavy rains or snow. With my arrangements, I can dip 3,000 head per day. It has been two years since I have had any scab in my herds; but it cost me over \$3,300 before I would believe they could not be cured while I used the same corrals and range while doctoring them."

Thorough treatment and prompt attention cannot be too strongly urged in this disease, for the safety and welfare of the flock.

### **Sore Eyes.** (See OPHTHALMIA.)

**Sore Lips.**— Sometimes the lips of sheep become so sore and swollen as to render eating not only a very painful process, but almost impossible. Wash the parts affected with warm soap suds, and apply freely over the surface an ointment made of the following compound: Five ounces of glycerine, one drachm of camphor, one drachm of alcohol, one ounce of flowers of sulphur, and one-half ounce of creosote. This may require several applications, but is a sure remedy; apply twice a day. An ointment made of tar, a little sulphur, and unsalted butter or lard, is also a good remedy. It should be applied about twice a day, for several days.

**Ticks and Lice.**—Ticks and lice are a great nuisance, and not only cause a great deal of suffering to the poor animals, but keep the sheep in thin flesh and deteriorate the fleece. They will also sometimes cause sheep to pull their wool. No flock infested with them will flourish either as mutton or wool producers. Neglected sheep will be very apt to have these parasites, and often those having the best of care; therefore it is well for the farmer to guard against the evil, as they can be easily destroyed.



SHEEP TICK AND  
EGG.

After the sheep are sheared the ticks leave them and get in the longer wool of the lambs, where they will feed on their more tender flesh. They will usually have all left the sheep by the third week after shearing; the lambs should then be dipped in a decoction of tobacco or other wash to exterminate these pests. For this purpose a deep, narrow box or tank is the best construction for the wash. The usual allowance of tobacco is six or seven pounds of plug tobacco for one hundred sheep or lambs. It should be chopped into fine pieces and boiled until the strength is extracted. If too strong it will have a tendency to sicken or kill the lambs.

Another wash sometimes used for the eradication of these parasites is a solution of arsenic and water, made by dissolving three pounds of white arsenic (powder) in boiling water, and adding forty gallons of cold water. Great care must be used not to inhale the vapor from the boiling water and arsenic, as it is a deadly poison, and the person who dips the sheep must have his hands free from eruptions, bruises, or cuts, or he might be poisoned by the process. After dipping the lambs, the wash must be put where no animal can have access to it.

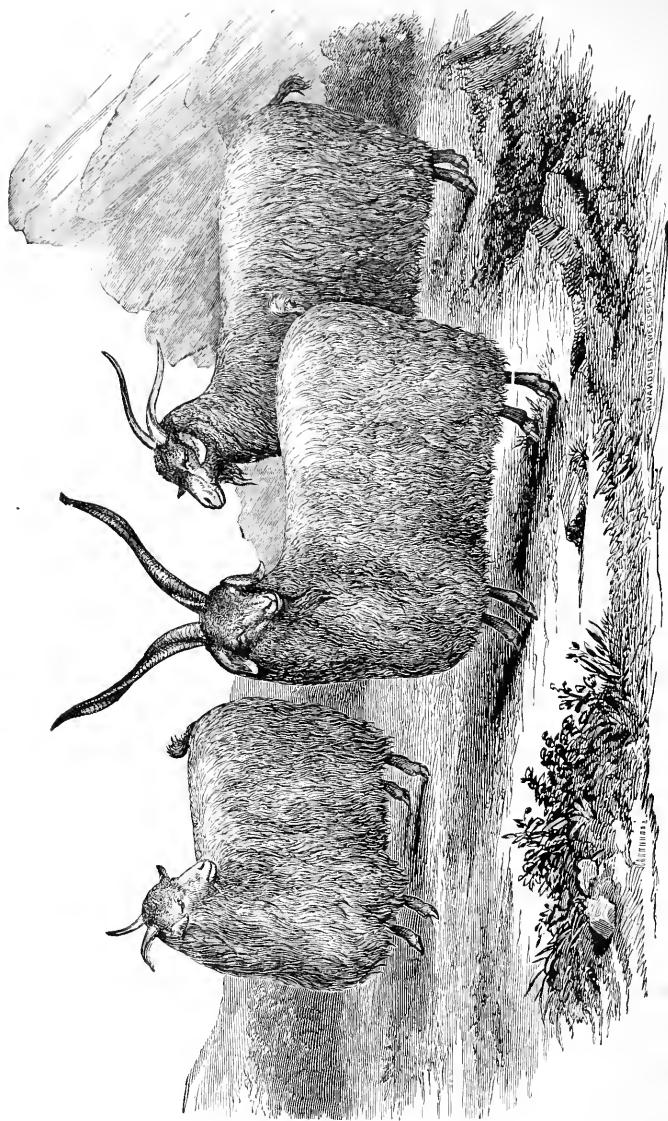
In dipping, one man should hold the animal by the fore legs with one hand, and with the other clasp the nose and mouth to prevent the liquid from entering; another man holds it by the hind legs and they dip it in this position, after which the animal is placed in an empty tub and the water squeezed from the wool, which can be saved as it accumulates, to add to the wash. Care should also be used to prevent the wash getting into the animal's eyes. The animal should not be allowed to remain long in the wash as injurious results would follow, but simply immersed and taken out as soon as the wool is saturated, which will require but a moment. Pregnant ewes should always be handled with care.

**Worms.**—There are many kinds of worms that sometimes affect sheep and lambs, causing great suffering and even death. The intestines of a sheep are very long, being twenty-eight times the length of its own body, while those of the human species is only about the length of the body; this extraordinary length in the sheep allows room for a large number of diseases, and when death is caused by worms, an examination of the stomach and bowels will often reveal myriads of them. It is supposed that the germs of the worms are admitted to the stomach with the food, the eggs being swallowed with the grass. The germ of the tape worm is thought to be voided by most animals, especially the dog. The symptoms of the tape-worm are variable, sometimes that of a voracious appetite, and again evincing a disinclination to touch food, loss of flesh, and an unnatural appetite for ashes, mortar, sand, earth, etc.

The evacuations lose their natural form and become soft, giving the sheep a filthy appearance like diarrhea. An ounce of turpentine mixed with milk and given in the morning before the animal has eaten anything, keeping food from it for an hour following, to be repeated each alternate day for ten days, is often practiced with good effect, after which a good dose of castor or linseed oil should be given to free the system. Good, nutritious food should be given during the time of treatment.

Other remedies recommended are as follows: two-thirds of an ounce of turpentine, with two ounces of linseed oil, mixed in a strong decoction or tea made of worm seed, (*Chenopodium anthelminticum*) commonly known as "Jerusalem Oak," given twice a week for





### ANGORA GOATS.

Bred by Col. Robert W. Scott, Frankfort, Ky.

two or three weeks. This is said to be a sure cure, and the sheep will usually get well and begin to fatten in about three weeks. Bruising a quantity of pumpkin seeds, and giving a strong tea made from them for several days, is said to be a safe and effective cure. Having never tried this remedy, we cannot recommend it from experience. Hair worms are also very common and troublesome in sheep, and are frequently found in the stomach and intestines of sheep and lambs that have died from persistent diarrhea, and are a species of *trichocephalus*. When afflicted with them the animal will have diarrhea and become rapidly emaciated; the worms are also often seen about the vent.

Salt and sulphate of iron in half-ounce doses, given each alternate day for a few days, is a remedy often resorted to. Care should be taken not to give too large a dose as the sulphate of iron is very astringent and might do harm if improperly administered. The above remedies for tape-worm are also recommended for the hair or pin-worm.

These parasites are the cause of much irritation and injury to the stomach and intestines. They burrow their heads into the lining membrane of each and suck the juice from them, upon which they subsist. The remedy, to be effective, must be such as will destroy the worms without injury to these delicate membranes of the sheep. Turpentine is thought by some to be injurious to the kidneys, but it is more frequently used for this difficulty than any other remedy. It is highly important to give nutritious food in order to support the strength of the animal, as the effect of the worms is very debilitating. The doses above recommended are suitable for a full grown sheep. Lambs should of course take a proportionate quantity.

Another common parasite very troublesome, is the *Strangylus filaria*, which is a thread-worm that infests the air passages of both the throat and lungs of the sheep, and is usually present in flocks that have access to ponds and streams, and that pasture on wet, swampy lands. This worm is a species related to that which is troublesome to fowls, causing gapes in chickens, and is frequently fatal to lambs. Turpentine is the effectual remedy, and should be given according to the above directions. Well water is best for sheep, being free from the eggs of parasites.

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## THE ANGORA GOAT.

THE successful rearing of the Angora goat in this country, has thus far been limited to a few individuals, the numerous failures in this enterprise being attributed to incompetent management, unnatural location, climate, and food, and by permitting the herds to deteriorate by not maintaining a high standard in breeding. The pure-bred Angora goat is in many respects the most valuable lanigerous animal known, and we believe the time is not far distant, when the value of the industry which it represents will be more fully understood and appreciated in this country, and those localities suited to its successful development will be appropriated to this enterprise, which will materially add to the nation's wealth and prosperity.

The Angora goat is often improperly confounded with the Cashmere species, although it is very different, the two varieties being almost as distinct as a goat and a sheep, and should never be classed as the same. The principal feature of the Angora is the length and quality of its hair, which has a very soft and silky texture, is strong, fine, and lustrous, and for various uses is unexcelled in strength, durability, and cheapness. This hair covers the entire body, and a great portion of the legs, with a compact, lustrous, wavy fleece, the animal in its best condition producing ten to twelve pounds of the mohair, at a single shearing, although the average is generally less than ten pounds. The horns of the male are quite long, nearly vertical, and somewhat spiral in form, while those of the female have a horizontal tendency resembling those of a ram. The face resembles somewhat that of the sheep.

The coat is composed of two kinds of hair, the one short and coarse which lies close to the skin, the other long and curly, and partaking of the nature of wool, forming the outer covering of the fleece. Both are used for manufacturing purposes, but the exterior portion, which makes by far the greater bulk, is the more valuable part of the fleece.

The Cashmere goat has a delicate head, with long, wide, semi-pendulous ears. The horns are erect, slightly spiral, and inclining inward to the extent that they sometimes cross. Like the Angora, the coat is composed of two materials, but it is the under coat of this breed, or that next the skin, that is the most valued in commerce. This under growth is of a grayish-white tinge, is soft, silky, and of a fluffy nature similar to down; the quantity produced by a good specimen of the breed will weigh from six ounces to a pound, the average amount being less than half a pound. This under growth of the Cashmere makes its appearance in autumn, and continues to grow until the following spring, when, if it is not removed from the fleece by being combed out, it falls off naturally, like the feathers of a moulting bird. It is used in the manufacture of the celebrated cashmere shawls. The difference between these two breeds of goats is thus very readily seen. The habitat of the Angora goat is a mountainous region, high and dry, with free range for exercise and browsing the shrubs and coarse herbage upon which it subsists. While the goat will be healthy, and produce a fine fleece in some other localities, it will not be as white and fine as in the cooler and dryer regions. Nevada, New Mexico, Montana, and some portions of California, as well as many other sections of the west, will prove a desirable climate for the Angora goat husbandry, while the Appalachian or Alleghany ranges, from the central portion of Virginia to Alabama, are also admirably adapted to it. Says a recent writer on this subject:—

“The industry in Asia Minor is dwindling away, from oppression, taxation, unusual losses by stress of weather and short feed, and the general inefficiency that marks the decaying Ottoman Empire. It is being successfully transplanted to the English Colonies, notably those of Australia and South Africa. The value of the product has been, at the latter point, increased from \$1,625, in 1866, to \$650,000 the past year. In the United States the industry has had a precarious existence for thirty years. While in that time the merino industry has culminated, after a previous length of tutelage, in its present magnificent proportions, that of mohair has given very insignificant results, for the time, labor, and expense involved. The reasons are very plain to him who will look at the matter in an unprejudiced way. The Angora goat will not, like the sheep in its various breeds, thrive in most all localities and conditions. Therefore, the attempt to plant the industry amid the rich clover-fields of Belmont, in Massachusetts, the vast undulations of Texas, the slopes and adjacent islands of the California coast, etc., has, in most cases, proved a failure. There is no reason whatever to doubt that when the order of nature, as to the home, habits, and food of the animal are observed, the Angora will thrive in the United States as well as in Asia Minor.”

The illustration represents specimens of the Angora goat from the herds of Col. Robert W. Scott, who has been an extensive breeder of these animals for more than twenty years. The likeness in front is of a pure-bred buck, that on the left of a pure-bred ewe, and that on the right of a full-blood ewe, made by crossing the common goat (five or more times) with the pure Angora bucks.

**Importations of the Angora Goat into the United States.**—The first importation of this goat to the United States was made by Dr. Jas. B. Davis, of South Carolina. This gentleman was, during President Polk's administration, sent to Turkey by the request of the Sultan of that country, to experiment in the culture of cotton in the Sultan's dominions; on his return to America, in 1848, the Sultan ordered a selection of nine of the finest specimens of fleece-bearing goats in his dominions, and presented them to Dr. Davis, to experiment with in this country. Since that time various other importations have been made. Col. C. W. Jenks, of Boston, has recently imported for Hon. Richard Peters, of Atlanta, Georgia, several fine specimens of the Geredeli Angora breed from Asia Minor, to add to his flock of

several hundred of these animals on his ranche in Georgia. This gentleman has been engaged in the Angora goat husbandry for about thirty years, and has not only found it a pleasant but profitable enterprise. So valuable were the animals considered that were imported by Dr. Davis, that he readily sold their offspring at from one to three thousand dollars per pair.

**Habits and General Management of Angora Goats.**—With respect to the treatment of this subject, we shall depend largely upon information furnished us at our request by Col. Robert W. Scott, of Frankfort, Kentucky, who from his experience of more than twenty years in goat husbandry is fully qualified to impart valuable knowledge and suggestions relative to it. He says:—

"In size they are superior to the native or common goat. Wethers, when fully grown and fattened, will weigh from sixty to eighty pounds, live weight. A wether of my flock, two years old, has weighed, when dressed, fifty-four and a half pounds, net—the fore-quarters, eighteen pounds; the hind-quarters, twenty-one pounds; the saddle, twelve pounds; and the rendered tallow, three and a half pounds; the tallow much more in some other cases. The color of pure-bred and full-blood animals is almost invariably white, though some of the earliest descendants of imported animals were brown; some being gray and some black, also, in their native country, varying a little, perhaps, in species or family of species. Their gay and intelligent appearance, their cleanly habits, active and playful disposition, make them attractive on a farm; while in their nature they are so docile that they may be raised so as to be as familiar about the house and yard as the dog or the cat. Though they have great curiosity and enterprise, they also have strong local attachments, and after wandering all day will generally seek their usual shelter at night, especially if the weather be inclement. They do not break fences, or clear them at a single bound, as most other stock do, but will pass through a hole which is already made, will climb up a rail which leans at about forty-five degrees, or will bound on top of, and then over, a low fence. Any good farm fence five feet high, except stone fence, will keep them securely. Like other stock, they are more troublesome after they have acquired roaming and breachy habits. They bear coupling, hobbling, and tethering better than any other stock. In their diet they are almost omnivorous, eating in winter often what they have rejected in summer. On large farms much the greater portion of their diet will consist of weeds, bushes, briars, fallen leaves, brush, etc., and they are truly valuable for keeping lands clean of these. In winter, short grass and corn-fodder is all that is required, even by the breeding flock, and I have never found it necessary to feed grain of any kind to them at any season. A dry shelter is desirable for them, especially to the females in kidding season; though my flocks of males and wethers, even after they have been shorn in April, have never had any protection other than what they could obtain around a hay or straw-stack.

"In breeding they are precocious, the females capable of breeding at seven months, and the males of propagation still earlier. As the females carry their young only five months, it is possible for them to have young within twelve months old; but I do not think it advisable that either sex breed in less than twelve or eighteen months old. Generally the *pure-bred* animals have but one at a birth; while grade and full-blooded females will have from one to five, and with reasonable care will often raise as many kids as there are mothers in the flock, and often more. If the weather be pleasant, and the kids, at their birth, can once get dry, and stand up and suck, they require but little attention afterwards. The mothers may sometimes lose or leave them in large pastures, especially if they have more than one, when they are very young. Like deer, they incline to leave their young, and return and suckle them at intervals, during the first few days after birth. A protracted cold rain is often fatal to a kid at the time of its birth; it is therefore desirable to house the females at night during the period of parturition. The males should be bred to the females, so that the kids will come in pleasant weather, and as simultaneous as possible, for which, and other reasons it is

preferable, commonly, to keep the adult males and wethers separate from the breeding flock. The bucks are said to be valuable in protecting the flock from the attacks of dogs, and under my observation the goats are most commonly the attacking party, having seen them frequently charge and drive away a loafing dog. They do not, by flight, invite the pursuit of dogs, as sheep do; and dogs do not seem to have the same disposition to worry or to eat them, which they manifest towards sheep. The goats will often bite, hook, and butt each other, yet they are never cross with other stock, and the males do not fight and injure each other as male sheep often do.

Hon. Richard Peters of Georgia, says: "The Angoras in this climate shed their 'overcoat' of mohair in March or April of each year, if it is not sooner sheared. They continue in their summer suit of short hair or kemp until July, when the mohair starts out, growing slowly until September, then rapidly until January, when it gets its full growth, averaging in length about nine inches. I have owned Angoras from six distinct importations from Asia. I have found them to differ greatly in size, fleece, horns and the shape of their ears. For over twenty years I have observed the following rules in selecting a stock buck: 1st. Weight and length of the white ringleted fleece, its freedom from coarse hair or mane along the back and on the neck and thighs; 2d. Size and stamina; 3d. Long pendant ears; 4th. Spiral upright horns. By this system of selection I have obtained a flock possessing great uniformity.

In making other importations, the agent should remain in Angora (the central district of Asia Minor) at least one year, so as to be able to make his selections when the goats are in full fleece; by this plan some fine specimens might possibly be obtained. Several of the importations were doubtless procured near the coast, they evidently being of mixed blood, and in no respect superior to American grade Angoras, called at the west 'full bloods'; such as are of a higher grade than a fourth cross, or 31-32 Angora and 1-32 common short haired native goat. The fleece of the pure-breed Angora males is coarser than that of the females, and becomes shorter in both from year to year after the fifth year."

**Care of Kids.**—If the bucks are allowed to run with the flocks, there will be two crops of kids per year, one coming in the fall or winter, which will require considerable care. It is better therefore, to so manage, if they produce but once annually, that the kids shall come in the spring, after all danger from cold winds and rains has passed.

The period of gestation is from a hundred and forty-five to a hundred and fifty days. Until young kids have suckled they are very sensitive to cold, but having once had their nourishment, their vitality seems wonderfully increased, and is greater than that of almost any other domestic animal. When about three weeks old, castration should be performed on all males not designed for breeding purposes. The kids are easily managed at this period, and the wound rapidly heals. The treatment should be similar to that of castrating lambs.

**Food of Goats.**—Goats will pick up a subsistence where almost any other animal would starve. They like best to browse among the rocks on briars and bushes, and will soon clear a pasture of them, which is a cheap and easy method of clearing such lands. They will never feed on clover or grasses as long as they can have access to such coarser herbage; in fact, if highly fed on clover and the cultivated grasses, they will not thrive.

**Grades, etc.**—It is better to maintain the flock pure, although by breeding a thorough-bred buck to the common goats of the country, a fine grade can be produced in five or six years that, to all appearance, are nearly equal to the pure bloods; but these grade bucks should never be used to perpetuate the herds, for if they are, disappointment will be the result. Only pure bred bucks should ever be used, as the grade bucks will deteriorate the flock, however good specimens of the breed they may appear to be. It is to this mistake of using grade bucks that the greater part of the failures of the Angora goat culture in this country is due.

There are some breeders who have crossed pure bred animals upon the common goats of the country, and have in some instances sold grade animals as though they possessed all the excellence of the pure bred goat, and the purchasers breeding them to the common goat as such, have experienced the failure that would naturally result, and, becoming disgusted with the business, have let the breeds run entirely out. In the hands of intelligent and honest breeders, with suitable surroundings, including wide range and a high and dry habitat, there is no reason why goat husbandry in this country may not prove eminently successful and profitable.

**Goats Used to Protect Sheep.**—Farmers in some sections of the country use goats to protect the sheep from dogs. For a flock of from fifty to seventy-five sheep, two goats is the usual number for this purpose, and they are said to be amply able to protect them from such intruders, their butting propensities being too much for the canine, who soon finds himself rolling over and over. A few repetitions of such treatment causes the dog to leave the field in a limping condition, somewhat downcast in appearance. When the sheep have no such protection, and a dog enters the field at night, the sheep will run wildly about, bleating piteously, but when goats are used to guard them, they form in a compact body, behind the goats, and seem to be fearless, and to rather enjoy the fun. This practice of utilizing goats originated in the West, where they were put in sheep pens to protect from wolves.

**Products of the Angora Goat.**—The most important product of the Angora goat is the mohair, which its fleece supplies. It is not a mere substitute for wool, but occupies its own place among the textile materials. It preserves the lustre and appearance of silk, without its suppleness, and differs from wool in its lack of felting qualities, the fabrics made from it having always distinct and separate fibres, being distinguished particularly for their lustre, durability, and elasticity. It is particularly adapted to the manufacture of Utrecht velvets, commonly termed "furniture plush," the finest qualities of which materials are composed principally of mohair. This plush is very durable, owing to its elasticity, the fibre springing back immediately to its upright position when a pressure against it is removed. The mohair plush is therefore in general use in the construction of railroad cars, being the most indestructible of all materials for upholstering the seats. It is also used in a similar manner in manufacturing the imitation of seal skins, the highest qualities of which are often very striking in their resemblance to real seal fur.

Mohair is also used for making the best carriage and lap robes, having a long and lustrous pile, some imitations of the skins of tigers and leopards being very beautiful. It is indispensable in the manufacture of braids for binding, possessing the lustre of silk with a superior durability.

Still another important use of this material is in furnishing fine and beautiful fabrics for dress goods, which resemble alpaca, and are called mohair lustres or brilliantines. In France it is used in the manufacture of laces, which are substituted for the silk laces of Valenciennes and Chantilly. The English have attained the greatest success in spinning mohair, the French and German manufacturers depending almost exclusively upon English yarns of this material, with the exception of that spun at Bonbaix in France. Owing to the stiffness of the mohair, it is rarely woven alone; hence, when used for filling, the warp is usually of cotton, silk, or wool; or if used for warp, the filling is usually one of these materials. The flesh of the Angora goat is highly nutritious, as well as very healthful and easy of digestion; and if well fattened with corn, is thought by many to be superior to the best Southdown mutton. The milk is also very nutritious and is often prescribed by physicians for invalids and infants. The skins of the young kids are valuable, when taken off after the hair is of proper length, and bring a high price in the market, as well as those of the

older animals. Their hides are manufactured into morocco leather. When we come to consider the ease with which these animals are reared, and the slight expense involved in the food consumed by them, there is scarcely any animal that returns so much in products for the capital invested.

**Shearing Goats and Preparing Mohair for Market.**—As with the shearing of sheep, considerable care is necessary to have the wool in a fine condition for market; the same is true respecting the preparation of mohair for sale and the manufacturers' use. Col. Robert Scott gives directions for shearing and packing the mohair, as follows:

"About the 1st of April, in Kentucky, when a somewhat fuzzy appearance in the fleece denotes that some of the goats begin to shed their wool, they should be well washed without the use of soap, in clear water (and the warmest accessible, though not artificially heated), and on a clear and sunny day. The males especially require washing. It may often be dispensed with after a heavy rain, and especially with the females and wethers. For this purpose, place a hog-scalding box, or other box or trough, near a clear pond or stream, and fill with water; submerge the goat to the neck in it, two men holding and rubbing. When the wool is cleaned of any dirt, and of the old skin which is being shed off, stand the goat upon a plank placed across the box, and press the wool with the hands, and let the water drain for a few minutes.

After drying thoroughly for a week or two in a clean pasture, they may be shorn like sheep, if practicable, cutting off the wool about the ends of the hair, which is then growing out among the wool of grade goats. It is desirable to get as little as possible of the old skin and of the growing hair in the shorn fleece of wool. Each fleece should be carefully rolled up separately, outside out, and tied up securely and closely with small, fine, colored thread or twine. Pack the fleeces closely in a bag which will contain one hundred and fifty or two hundred pounds, and it is ready for market. The female goats should be handled with great care, as, in this climate, they are then heavy with young."

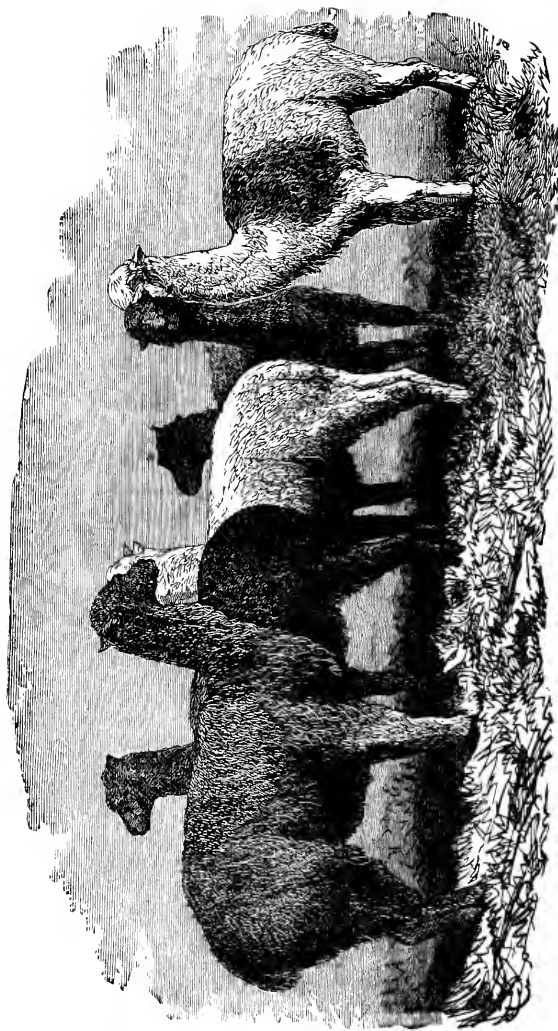
**Diseases and Parasites of the Angora Goat.**—This species of goat, as well as most others, is extremely hardy, as will be seen by the following statements from two of the oldest breeders of goats in the country.

Colonel Robert Scott says: "Though I have been breeding these animals twenty years, and once had over two hundred head of them of all ages, yet there has never been any epidemic disease among them. During this time I have lost several by worms in the nose, as with sheep, and one by a swelling of the glands of the throat. A humor in the cleft of the hoof, like scratches in horses, has given me more trouble than all other diseases. It is caused by wading through high, wet grass, yields readily to strong acids, and never kills. Wash the sore repeatedly in carbolic soap suds, or in turpentine, and then apply a salve made of bluestone, copperas, or tar. A variety of small, long, red vermin is peculiar to them; is not fatal, and can be destroyed mainly by preparations of tobacco, cresylic soap, or camphor, sulphur, etc., applied along the back."

Mr. Peters of Georgia also states that: "The Angoras may be classed with the herbivorous animals. They have not proved to be a success in the Eastern and Middle States, when kept in small enclosures on grass, during the summer, and in winter in close barns, and fed on grain and hay. At my farm, near Atlanta, they have succeeded admirably, being exempt from disease and able to protect themselves from attacks by dogs; but they are allowed to run out, summer and winter, in an inclosure of over a hundred acres of woods-pasture land, which they have greatly improved by killing the undergrowth of briars and bushes."

It will be seen by the preceding statements, that goats may be easily reared in a climate adapted to them, that they have few diseases, and under proper management the industry may be made a remunerative one.





GROUP OF ALPACAS.

## ALPACAS.

**T**HE Alpaca is a native of the lofty table-lands and mountain range of the Andes in Peru and Chili, and has long occupied in that region of the globe, the position held by its congeners of larger size—the camel—in the old world. Llamas were to the ancient Peruvians the only available beasts of burden and wool-bearing sources, the same as the camel is at the present day to the tribes of the Asiatic deserts. The camel (*Camelus*) and llama (*Auchenia*), form the two existing genera of the family *Camelidae*, and they thus, in a zoological sense, represent each other in different regions of the earth. A great deal of doubt and confusion, however, has existed as to the number of species into which the llama can be divided.

Most authorities now agree in regarding them separable into four species, viz.: the llama (*Auchenilama*), the huanaco or guanaco (*A. huanaco*), the Alpaca or paco (*A. paco*), and the vicugna (*A. vicugna*). The llama and guanaco were formerly more valued as beasts of burden, and their flesh, than wool, being able to bear daily from 120 to 150 pounds burden over long distances.

**Description, etc.**—The guanaco attains about the size of the red deer, and is the largest, as well as most widely disseminated of all the species, being found from the equator to Patagonia. The llama is next in size, and is mostly limited in its habitat, to the loftier mountains of Northern Peru. The Alpaca is considerably smaller than either the above-mentioned species, but in general outline all the species have a strong resemblance. In its native condition, the Alpaca ranges between 10° and 20° south latitude, from the center of Peru into Bolivia, not often coming lower down than between 8,000 and 9,000 feet above the sea-level. At and above these heights, it lives in herds in a semi-domesticated state, being only driven into the villages to be shorn.

The wool is of very fine quality, lustrous, and in color mostly white, black, or gray; the shades of brown or fawn are sometimes seen, but are more rare.

The illustration of Alpacas is from a photograph of a group of these animals from the flock of Hon. Francis Thomas, formerly minister to Peru. They were imported by him, and placed on his farm in Frankville, Alleghany County, Maryland. Mr. Thomas, in writing to a friend respecting them, says:

"The fibre of a fleece of twelve months' growth often exceeds fifteen inches in length, and the fleeces average from seven pounds to ten pounds each in weight. The animals live to the age of twenty, twenty-five, and sometimes thirty years; are too large and bold to be worried by dogs, and very docile and tractable. I think you will concur with me in the opinion that this experiment which I am conducting is well worth the expense which I have incurred, especially when we consider the public benefit which would accrue in case of my success."

**Domestication, Value of Wool, etc.**—There is evidence of these animals having been domesticated and used for their wool, from remote antiquity, as remains of clothing made from the Alpaca wool have been found in the graves of the Incas; and when, in the early part of the sixteenth century, Peru was first visited by Europeans, these animals formed the chief wealth of the natives, being carriers of commerce, as well as the main source of their food and clothing. The wool first became an article of commerce in England in 1829, and in 1836 it became an established trading commodity with Europe. In that year Sir Titus Salt, a manufacturer in Bradford, purchased a quantity of Alpaca wool and tried various experiments to discover its value and capabilities. His great success led to the establishment of extensive manufactories, and making Alpaca a staple second in importance to wool. England now imports annually above 3,000,000 pounds of this wool.

Many systematic and costly attempts have been made to introduce the Alpaca to Australia. The experiments at first gave promise of success, but gradually they failed to become acclimatized, and weakened by the loss of their native mountain-climate, they finally drooped, and so many died that the prospect of success seemed anything but encouraging. Notwithstanding various failures to introduce this valuable animal into other than its native climate, we see no reason why it should not prove a decided success, providing we follow the law of their nature, and place them in localities and conditions as nearly allied as possible to their own native mountain-habitat. A noted agricultural authority speaks of their introduction into this country, as follows:

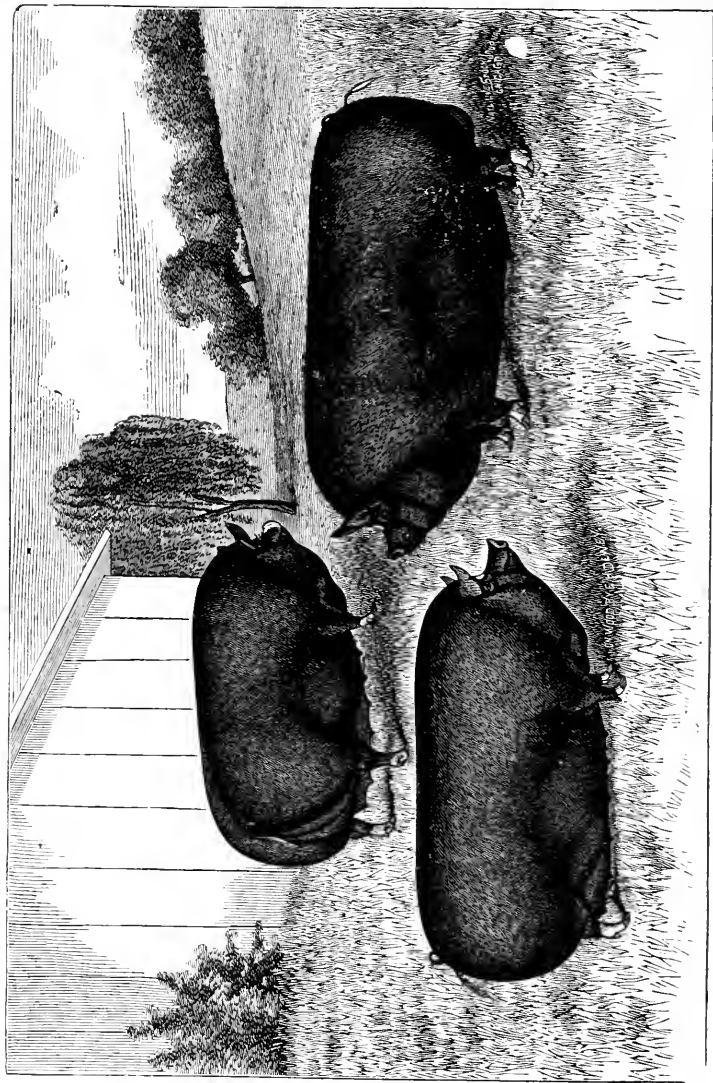
“Attempts have been made at various times in this country, in Europe, and in Australia to introduce the alpaca, but generally without profitable result. Various causes have contributed to the failure of these efforts. Sometimes the confinement on shipboard during a long voyage, with impure air and unaccustomed food, has nearly destroyed the stock. Again, the animals, when brought to their destined abode, have been placed on luxuriant clover pasture, or other food, so much richer than the coarse herbage of their native regions that disease has fastened on the whole flock.

The alpaca is indigenous in the mountain regions of Peru, and thrives in the highest inhabited districts of the Andes, where the cold is more severe than in most parts of the United States. Accustomed to the vicissitudes of such regions, and inured to cold, damp, hunger, and thirst, it is especially adapted to bleak hill districts. Yet it is said to do well in most localities where the air is pure, the heat not oppressive, and water for bathing readily accessible. The latter is stated to be indispensable to the health of the animal, which, when deprived of this requisite, soon becomes fevered and infected with scab.

While the introduction of the alpaca into this country still remains a matter of experiment, there is no known reason why such experiments should not be successful, when properly conducted, in localities affording some approximation of the native conditions of the animal. Not to mention many elevated situations in the Atlantic, Northern, and Central States, the regions lying along the Rocky Mountain ranges have been indicated as presenting good opportunities for such trials.”

It therefore still remains to be seen whether the rearing of these animals in the United States shall prove a success, and thus open a new field of enterprise and wealth hitherto unknown in the agriculture of this country.





Berkshires, "LADY HOOD II," "BLACK JOSEPHINE," "ROBIN HOOD."

Property of Alex. M. Fullford, Bel Air, Md.

## SWINE.

THE present domestic breeds of swine are the remote offspring of the wild swine (*Sus scrofa*), and though occupying a less prominent place in the estimation of the farmer generally than the horse, ox, or sheep, the hog is nevertheless an animal of great value, being easily reared, arriving quickly at maturity, subsisting on a great variety of food, and yielding a larger and quicker return in the amount of flesh in proportion to live weight and food consumed, than any other domestic animal whose flesh is used for food.

This animal is found in almost every zone, although his natural habitat, as with most of the thick-skinned animals, is in warm climates. The original country of the hog, however, is unknown, as is the case with many of the domestic animals. It has been known to exist in a wild state in Asia, Europe, and Africa, ever since history began. A species of wild hog is also found in America. Swine are very abundant in China, the East Indies, and those groups of islands found in the Southern and Pacific Oceans; they are also extensively raised in Europe, and especially in the United States, where pork is one of the most valuable exports, swine being raised in many States and Territories in the Union, and always at a fair profit when properly managed.

Swine are reared for meat alone, the sole aim of the breeder being to produce an animal that will render the largest amount of pork and lard, from a given amount of food. While swine are kept to a greater or less extent by all American farmers, the great swine-breeding regions of the country are northwest of the Alleghanies. Of the nearly forty millions of hogs in the United States, it is estimated that three-fifths of that number are raised in the following Mississippi Valley States, viz.: Illinois, Iowa, Missouri, Indiana, Ohio, Kentucky, Tennessee, Kansas, Nebraska, and Wisconsin; while these States produce annually about three-fourths of the entire corn crop of the country.

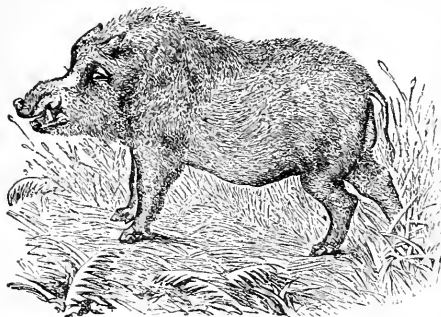
With a large home consumption, some of our recent exports of pork and its products have amounted to nearly a hundred millions of dollars annually. From the fact that swine are easily kept and fattened, they afford an easy and profitable means of converting the bulky and low-priced farm products of the Great West into a portable and salable commodity, the pork-packing establishments of Chicago and Cincinnati being the largest in the world.

It is interesting as well as amusing to compare the facts concerning swine and other farm stock gleaned from the scant literature of 150 to 200 years ago with that of the present time, and to note the progress that has been made during that period.

John Laurance, M.A., rector of an English parish, edited a work upon "Agriculture and Gardening," which was published in the year 1726, in which he speaks of the hog as a useful animal in that he furnishes good substantial meat for human consumption, but refers to him as a beast hard to restrain, as he is given to tearing down fences, and going wherever he likes. He mentions white as the prevailing color, but states that, of late, "a black hog has been introduced, smaller in size than the common hog of the country, and having a big belly."

Another work published in London about that time, edited by James Lambert, and entitled "The Countryman's Treasure," in describing the desirable qualities of the boar, says: "His bristles should be rough and strong, erecting themselves on every occasion of anger and disgust." The same work also recommends,—"that in order to keep fattening hogs free from the measles, put finely sifted red lead or red ochre in the swill. Also dead flesh should be kept away from them, and neither should they be permitted to drink fish water, nor the washings of any mustard plates or trenchers, nor any soap water, for that will sicken them and breed diseases in their eyes and head. Nail thin plates of lead in the bottom of their troughs, which will cool their noses, and make them feed with more delight, and by a secret quality hinder inflammation of their lungs. Let their styes be in such places where the extremes of heat and cold may not affect them, though they rather covet cold than heat, being themselves of a hot constitution."

**Origin of the Present Breeds of Swine.**—It is asserted by eminent authority that all the known breeds of swine may be divided into two classes or groups, viz.: one having the characteristics of and doubtless descending from the common wild boar; the other differing in several important respects from the latter and of wild, unknown parentage. By crossing and other conditions favorable to the improvement of the race, for several generations, these distinctive characteristics have gradually become largely changed. It is well known that where swine run at large, often going far in search of food, they will in a few generations adapt themselves to this kind of life, and become good travelers, having long legs suited to the purpose; and if in addition to this they are obliged to root for a portion of their food, their snouts will become proportionately long and powerful. On the other hand, when hogs are well housed and fed, being well cared for in all respects for a long period, they also become changed for the better; the skin and hair becomes finer, the legs shorter and finer, with a more symmetrical body, smaller head, ears, and snout; and while as workers for a living they grow slowly and are long in reaching maturity, under the latter favorable conditions, they grow rapidly and mature early; all of which shows that these animals, as well as those of some of the higher order, readily adapt themselves to circumstances. The following is a very correct representation of the wild boar, the pig progenitor of the porkers of to-day, but when compared with our improved breeds the relationship could scarcely be recognized. He



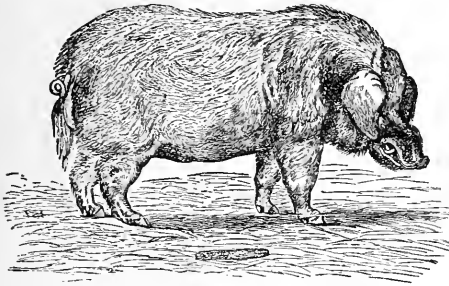
WILD BOAR.

is described as having a large tusk, a long snout, and a much larger head in proportion to the size of the body than our domestic pig; also with smaller ears, pointed and upright, and at maturity usually black. He does not attain his full growth until he is five or six years old, and has been known to live twenty or thirty years. The sow breeds but once a year, and seldom has more than five or six at a litter. She suckles them for three or four months, and allows them to follow her two or three years, or until they are strong enough

to defend themselves, so that she would often be followed by three litters of different ages at one time. The original or native breeds of Great Britain seem to be two; the old English hog, and a breed found in the Highlands and islands of Scotland. The former is described as tall, gaunt, a very long body with a thick covering of bristles, pendent ears, and long snout. The latter breed were small, of a dusky brown color, with coarse bristles along the spine, and prick ears. They were exceedingly hardy, subsisting upon the poorest fare, and often left to range about without shelter and take care of themselves as best they could. The improved races, now brought to such a high degree of excellence, were obtained by crossing these native breeds with foreign hogs, the Chinese and Neapolitan being the principal ones for this purpose. The modern *white* breeds with fine bone, thin skin, short limbs, prick ears, and remarkable propensity to fatten at an early age, take these qualities from the Chinese stock; while to the Neapolitan is attributed the characteristics which distinguish the improved *black* breeds, of which the Essex is a fine type.

The latter class are characterized by very fine bone, black color, soft skin nearly destitute of hair, very small muzzle, and early maturity. It will be seen, by comparing the following illustration of the Old English hog with the former, that a great improvement has here been made upon the wild boar to attain to even that standard; and that further improvement could be made by simply good care and judicious selection. As it is, it will weigh more in

proportion to size than the wild hog, and is withal a better animal in all the pig points. The descendants of this old breed are now seen principally in the western counties of England, where hogs of immense size are still reared, but greatly improved, when compared with their ancestry, all of the points of the improved English hog being much finer, the carcass thicker, and the propensity to fatten greatly increased. This breed is exceedingly prolific, the sows, which are excellent nurses, often having from twelve to eighteen pigs in one litter. It is supposed that the Berkshire and Hampshire came originally from this stock, but by some early cross obtained their present characteristics. It is found, however, that sows of the Neapolitan breed and its crosses are better mothers and nurses than the Chinese; both kinds also requiring peculiar care to prevent the breeding sows from becoming hurtfully fat; so much so that unless kept on rather scanty fare they become useless for breeding.



THE OLD ENGLISH HOG.

Darwin, in his observations upon the variations of swine under domestication, has the following, touching the tendency of domesticated animals to revert to their feral or wild type:

“The common belief that all domesticated animals, when they run wild, revert completely to the character of their parent stock, is chiefly founded, as far as I can discover, on feral pigs. But even in this case the belief is not grounded on sufficient evidence; for the two main types of *S. scrofa* and *Indicus* have

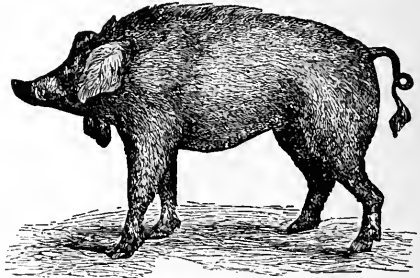
never been distinguished in a feral state. The young re-acquire their longitudinal stripes, and the boars invariably re-assume their tusks. They revert also in the general shape of their bodies, and in the length of their legs and muzzles, to the state of the wild animal, as might have been expected from the amount of exercise which they are compelled to take in search of food. In Jamaica the feral pigs do not acquire the full size of the European wild boar, ‘never attaining a greater height than twenty inches at the shoulder.’ In various countries they re-assume their original bristly covering, but in different degrees, dependent on the climate; thus, according to Roulin, the semi-feral pigs in the hot valleys of New Granada are very scantily clothed, whereas on the Paramos, at the height of from 7000 to 8000 feet, they acquire a thick covering of wool lying under the bristles, like that on the truly wild pigs of France. These pigs on the Paramos are small and stunted. The wild boar of India is said to have the bristles at the end of its tail arranged like the plumes of an arrow, whilst the European boar has a simple tuft; and it is a curious fact that many, but not all, of the feral pigs in Jamaica, derived from a Spanish stock, have a plumed tail. With respect to color, feral pigs generally revert to that of the wild boar; but in certain parts of South America, as we have seen, some of the semi-feral pigs have a curious white band across their stomachs; and in certain other hot places the pigs are red, and this color has likewise occasionally been observed in the feral pigs of Jamaica. From these several facts we see that with pigs, when feral, there is a strong tendency to revert to the wild type; but that this tendency is largely governed by the nature of the climate, amount of exercise, and other causes of change to which they have been subjected.

“The last point worth notice is, that we have unusually good evidence of breeds of pigs now keeping perfectly true which have been formed by the crossing of several distinct breeds. The Improved Essex pigs, for instance, breed very true; but there is no doubt that they largely owe their present excellent qualities to crosses originally made by Lord Western

with the Neapolitan race, and to subsequent crosses with the Berkshire breed (this also having been improved by Neapolitan crosses), and likewise, probably, with the Sussex breed. In breeds thus formed by complex crosses, the most careful and unremitting selection during many generations has been found to be indispensable. Chiefly in consequence of so much crossing, some well-known breeds have undergone rapid changes, thus, according to Nathusius, the Berkshire breed of 1780 is quite different from that of 1810; and since this latter period at least two distinct forms have borne the same name."

These wild hogs sometimes grow very large, but usually are less in size than our domestic swine. The engraving, of the old Irish Greyhound pig, exhibits an intermediate animal, a kind of connecting link between the wild and domestic hog. Richardson, from whose work the illustration is taken, describes this breed as follows:—

"They are tall, long-legged, bony, heavy-eared, coarse-haired animals, their throats furnished pendulous wattles, and by no means possessing half so much the appearance of domestic swine as they do of the wild boar, the great original of the race. In Ireland, the old gaunt race of hogs has, for many years past, been gradually wearing away, and is now, perhaps, wholly confined to the western parts of the country, especially Galway. These swine are remarkably active, and will clear a five-barred gate as well as any hunter; on this account they should, if it is desirable to keep them, be kept in well-fenced inclosures."

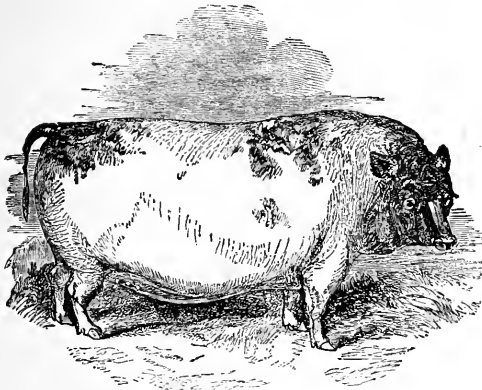


OLD IRISH FIG.

**The Chinese Hog**, previously mentioned as an important and potent element in the animal make-up of the Improved English Swine, is in shape very peculiar; the body being long, legs short, back long and swaying somewhat toward the center, the belly nearly touching the ground; jowls very heavy; ears small, and standing out from the head, but not drooping; head and snout short, and very wide between the eyes; neck short; color white or black, or a mixture of both, with the white predominating. The effect of the Chinese cross has been to completely transform the long-legged, elephantine-eared, coarsed-boned, gigantic hog of Old England into the heavy-jowled, short-legged, compact, early maturing, Berkshire, Essex, Poland, China, Small Yorkshire, and Suffolk of the present day. The prepotency of the Chinese blood is seen at every hand in all the improved breeds, there being a tendency to revert to the original Chinese type. Judging from the well known authenticity of the Chinese civilization, it is fair to presume that its breed of swine antedates in its origin that of any other race of domestic animals now known to Europe or America. The facility with which the Chinese pig fattens is one of its distinguishing characteristics; it being stated that from the time it is a week old till it is slaughtered at maturity, it is fat; that when kept in the same pen with others of our best varieties of pigs, the feed being hardly sufficient to sustain life in them, the Chinese pig is fat; when butchered, no matter at what age, the Chinese pig is a mass of fat. The flesh of this hog is not prized either in Europe or America, because of the superabundance of fat; but the effects of crossing this animal upon the old English breeds have been as remarkable as they have been satisfactory. The illustration given is the best obtainable representation of this justly celebrated animal, and shows him to be true to our description, and also a very peculiar specimen of the swine family.

In the foregoing facts briefly stated, have been indicated in a measure the original sources of our improved breeds of swine, and the physical changes which have been wrought in this animal by the treatment it has received in the hands of intelligent breeders. It will also be seen that the greatest improvements in our domestic breeds of swine have resulted by crossing with the hog of China and Italy. The hog of India has also aided much in this improvement. The Chinese imparted a remarkable aptitude to fatten, while the Neapolitan, and hogs of India, that of excellence of flesh and improved form.

An able writer has said that "the breed goes in at the mouth." With other conditions, such as shelter, watchful, sanitary care, and proper selection for breeding being included, we heartily endorse the statement; for with a distinct object in view, the breeder can arrange to have the pig travel slowly or quickly to the pork barrel, as may be desired; this being accomplished by allowing only such animals to breed as are suited to the purpose aimed at.



IMPORTED CHINESE SOW.

No one, however, should expect a high success as a breeder of any stock without proper management and care, including regular and liberal feeding, for without interest sufficient to induce him to give personal supervision and generous treatment to his animals, he has no reason to be disappointed if the result be meager and unsatisfactory generally. It has been found that a few months even, of neglect and starvation, will, in the majority of cases, counteract nearly all the advantages which the breed has acquired by generations of careful breeding and proper management.

**Neapolitan Swine.**—This breed of swine is noted for the excellent quality of its flesh, fine form, small bones, thin skin, slight quantity of hair, and aptitude to fatten readily. To this breed and the Chinese is due much of the improvement of all the English breeds, particularly the Berkshire, Essex, Yorkshire, and Hampshire. The first importations of these hogs into the United States was about 1840; they are described as having been of a dark slate color.

Neapolitans have a small head in proportion to the size of the body; face dishing; forehead bony and flat; snout rather long and very slender; ears small, thin, and standing forward nearly horizontally; jowls very full; neck short, broad, and heavy above; body long, cylindrical, and well ribbed back; the ribs arching; back flat; hind quarters slightly higher than the fore; legs small, with small joints; hams and shoulders well developed and containing a

large proportional amount of lean meat; color slate or of a bluish plum; skin soft and fine, and nearly destitute of hair.

These swine mature early, and their flesh is very tender and delicate flavored. A leading writer says of it, "they make the most delicate of all pork, which tastes more like the flesh of a fat, tender young chicken, than pork." The well known agricultural writer, Mr. A. B. Allen, says of them:

"Notwithstanding they are so highly prized by amateurs, for the delicacy of their flesh, these swine have not found much favor among Northern farmers, except by the way of a stolen cross now and then. The reason of this is, I presume, in consequence of their almost entire want of hair rendering them less hardy in enduring the winter than thicker haired animals; and the pigs, also, till they reach three or four months of age, being more tender. I do not know of any one in New York or its vicinity who is keeping up the pure breed. Those I imported, not being at that time in a position for breeding, I made presents to my friends, who inform me that they have suffered them to run out, finding the Berkshire more profitable to keep on their farms. My brother, the late Mr. Richard L. Allen, when traveling in Italy, in the spring of 1869, wrote me as follows:

'I have never seen finer pigs than are generally to be found around Naples. They are invariably black (by this it must be understood that they varied from this to a dark slate or plum color), with very fine legs, muzzle, and tail, and scarcely any hair; and what there is of it fine, and indicating speedy fattening qualities. The nose is generally too long, but I have seen models which the white Prince Alberts or Suffolks could not beat. These animals are coarser and less refined as we advance north, and in Rome are not so good, though they still retain many of their excellent fattening qualities. I have repeatedly seen them of the same type, wholly or mostly black, near the summit of the Alps, in Switzerland, where they are kept during the summer months, to consume the offal of the goats and cows.

How these creatures subsist here during winter, I do not quite understand. I saw myriads of them in Perugia (Italy)—it seemed to be a market day—going into town and out of it, and into the railroad cars, lean, long-eared, frequently marked much like Berkshires, with white on the face and feet, and many with a broad white stripe entirely around the fore part of the body. Those I saw in the fields were also very thin, and seemed occupied with grubbing, and always under the direction of an attendant; and I presume here they found all their sustenance till the pastures again produced clover, and the goats and cows milk. The pig seemed an important institution in the social arrangements of many of the peasants, as with the Irish, though in another fashion. One served as a shepherd dog, his master patting him as he ran up for orders; when he would start off on a gallop, to head off the sheep that were going in a wrong direction, again returning for an approving caress, and a new mission elsewhere.'

I have thought best to give the above extract entire, so that the reader may know the difference between the pure, high-bred swine of Naples, and those which are undoubtedly grades, in other parts of Italy and Switzerland, showing that, as such, they were hardy, thrifty, and docile.

In addition to the amusing anecdote I give from my brother's letter of a pig performing the duties of a shepherd dog, in another letter, which I cannot now lay my hand on, or somewhere else, I have read of one acting as a pointer to a sportsman shooting quails and partridges. This shows the Neapolitans as uncommonly tractable, and easily instructed, and commends them as excellent pupils for circus performance."

**The Hog of India.**—This animal is regarded as the ancestor of the Neapolitan, and as one of the means of improvement in our present breeds of swine. It resembles the latter in many respects, although differing essentially in others. This animal has a small head, dished face, thin jowls, slender, erect ears; small, short legs, being fine in all its parts;

hams and shoulders heavy, body compact, and well ribbed; color varying from a jet black to a slate, or deep plum; skin thin and elastic, but firm. The form is symmetrical, while the quality of the flesh is excellent. These characteristics have been transmitted largely to our present breeds in crossing with others.

**Improved Breeds of Swine.**—Fifteen or twenty years ago, but little attention was paid by the farmers of this country generally to the improvement of swine, except to breed from the best of the common stock; but at the present time we see that a great change has taken place in this respect, there being comparatively but few hogs raised that are not of the improved breeds, or their crosses; hence we now have the desirable qualities of compact form with the least amount of offal or waste; early maturity, readiness to fatten on a smaller amount of food, together with a better quality of meat. When we compare the present improved breeds of swine,—the Berkshire, Poland, China, and Essex, for instance, with their ancestors, the wild boar, old English, or old Irish, or Irish greyhound hog (as the latter is sometimes called), we shall then be able to realize what the breeder has accomplished, and some of the difficulties that have been met and overcome.

The breeds formerly raised were mostly white, but a large proportion of them now bred are black, or nearly so, the most numerous of these being the Berkshires, Poland Chinas, and Essex. The improved breeds of to-day are the Berkshire and Essex of the black varieties. the Poland China and the Jersey Red and Duroc, that are of mixed colors, black and white, the latter being a yellowish red with black spots, while of the white breeds we have the Yorkshire, the oldest and originally the largest of the English varieties of swine, a strain from which have come several types or breeds, through the efforts of English breeders, such as the Improved Large Yorkshire, the Middle breed, the Small Yorkshire, and the Suffolk. Then we have the Chester Whites and Cheshire, or Jefferson County hogs, that belong to the popular white breeds, these being distinctly American, as are also the Poland China, the Jersey Reds and Durocs. Of these, the Poland Chinas and Chester Whites have perhaps been bred in the largest numbers.

The principal English breeds are the Berkshire, Essex, Suffolk, Yorkshire, Dorset, Lancashire, etc., the first four mentioned being the most widely disseminated of breeds from this source. The above-mentioned breeds supply mainly the porcine products for the pork markets of the civilized world.

## BERKSHIRES.

**T**HE Berkshire is one of the oldest English breeds, it having maintained a high reputation for centuries; in fact, it seems to have taken the place among swine that the thoroughbred has among horses.—type of the highest style of breeding. These hogs are noted for compact form, fine bone, large muscles, and for furnishing excellent hams and shoulders. They produce more lean meat of excellent quality, well distributed, than many other breeds, and consequently a less proportionate amount of lard and other fat.

A good American authority says, "It has been generally said of the Berkshires that they were more likely to bring a large number of pigs at a litter than any other breed of swine. This, as a rule, has probably been the case in times past. What was true in this respect was also true as to their ability to rear their pigs, for they were good nurses, having abundance of milk. But from the laws, conditions, and habits which govern the breeding and nursing capacities of domestic animals in general, the hog is not by any means exempt.

When the Berkshire brood sow, through breeding for fancy and fat—the effort in these directions having been pushed to extremes—parts with her proverbial fecundity, taking her position alongside of other high-bred swine, this must be regarded in the same way as are the results of any other radical change in organization.

The fair-sized medium fatteners are the breeders for stocking the farm with pigs; and as the highest model for profit must be the same in every kind or breed of farm stock bred for its flesh, it follows that the different breeds of swine, as they take on this model, must, in obedience to inflexible laws, approach a common standard in the matter of increase. If the Berkshires were, as the evidences for a good many years seemed to show, superior to other breeds in bringing large litters, no one need be surprised if, in the hands of certain American and English breeders, they drop down in numbers as they change in refinement and tendency to obesity."

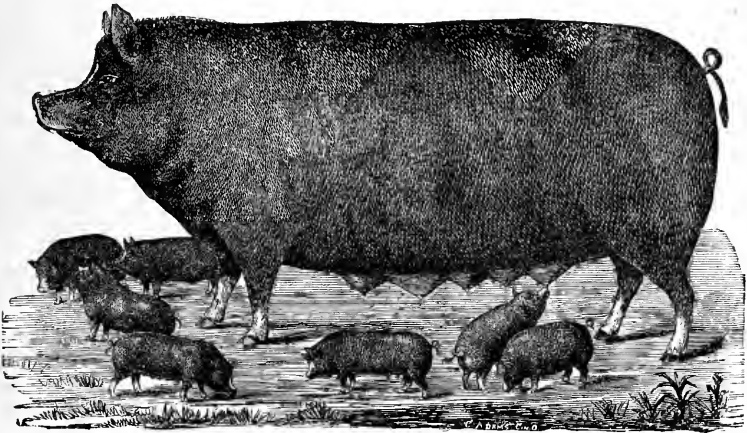
**Description.**—The Berkshire is characterized by a uniform black color, with white marking in the dish of the face, on the feet, and the brush of the tail. Sometimes a white spot or two appears on the other parts of the body, but such are generally discarded for breeding purposes, as the above color and markings are considered most desirable. They breed with great uniformity, although there are occasional indications seen of a reversion of the original color, by the appearance of reddish brown or bluish spots.

The improved Berkshires of the present day are a remarkably well defined breed, possessing in an eminent degree many valuable qualities. They may be described as follows: Face short, broad, and well dished; forehead broad, eyes rather large and bright; snout short, ears of medium size, thin, and soft, and carried rather upright; jowls full; neck rather short and thick; shoulders broad at the top, and deep through the chest; back broad; ribs long and well sprung, giving rotundity to body; hams thick, round, and deep, thickness extending well down on the back, causing the legs to stand well apart; legs short and fine, but straight and strong, with hoofs erect, tail tapering and rather fine; size medium; bones fine and compact; hair rather fine and soft; color of body black, with smooth, plum-colored skin; feet and tip of the tail white, with usually a dash of white in the face, and not unfrequently a white nose.

The large, heavy-boned Berkshire has been greatly modified, having lost its coarseness

and grown more shapely by the change, and these are desirable improvements; and when we add that the *average Berkshire* of to-day weighs at six months 160 lbs., at nine months 236 lbs., at twelve months 322 lbs., at eighteen months 413 lbs., and at twenty-four months 495 lbs., some reaching 600 lbs., it will be seen that we still have a good sized animal in the improved Berkshire. This is generally known to be the most active and muscular of all our breeds of swine; and while this has sometimes been offered as an objection, yet it is a quality that makes them especially desirable to follow cattle, a method of feeding much practiced by farmers in the great corn-growing regions; and when we consider that the hardiness and endurance resulting from greater freedom and much exercise is, doubtless, one of the principal reasons why this breed is less liable to the prevailing swine diseases than others are, we see that the objection is more than met.

The Berkshires are noted for their docility and prolificacy, the sows uniformly making good mothers as well as producing large litters. The young are strong and healthy, and soon able to take care of themselves, are generally of uniform size and appearance, grow rapidly to maturity, and can be marketed at an early age; thus enabling the breeder to make quick returns—a most desirable thing to do in these days when men travel by express, talk by telephone, write by telegraph, and print by steam.



IMPORTED BERKSHIRE SOW, "GRAND DUCHESS."

Property of W. L. Mallow, Concord Farm, New Holland, Ohio.

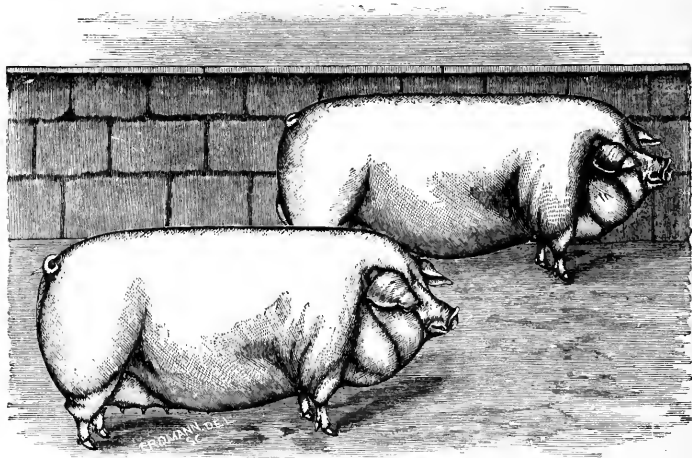
This animal is much used in crossing other swine stocks, with a view to improving it, there being a certainty of good results from such use. Besides, the Berkshire is a good grazer, thriving with the help of a little grain, and growing fat on good pasturing during the summer months; in brief, the Berkshire is among other breeds of swine, as distinguished a representative of the hog family, as is the noted short horn among cattle.

Our illustrations are faithful representations taken from photographs of the animals. The above was bred by Russell Swanwick, Cirencester, England, and is a good type of the breed.

## CHESTER WHITES.

**T**HIS breed derives its name from its having originated in Chester County, Pa. The history of its origin is as follows: In the year 1818 a fine pair of pigs were brought into this country from Bedfordshire, England, by Capt. James Jeffries, and sent to his farm near the county seat. Some of the more enterprising farmers of the neighborhood appreciating the desirable qualities of these animals, were encouraged to commence improving their swine, which they did by crossing the descendants of this pair upon the best formed and most desirable native stock that could be obtained; and thus by a course of careful and judicious crossing and selection for a number of years, the present valuable breed of systematically formed, good sized, and easily fattened hogs were produced, commonly known as Chester Whites.

This breed of swine has been very popular and much prized on account of their large size and the ease with which they fatten. They will readily weigh 200 to 225 pounds at from five to six months old, and from 400 to 700 pounds at twelve or fourteen months, while it is not unusual for an old hog, when well fatted, to attain the weight of 1,000 pounds.



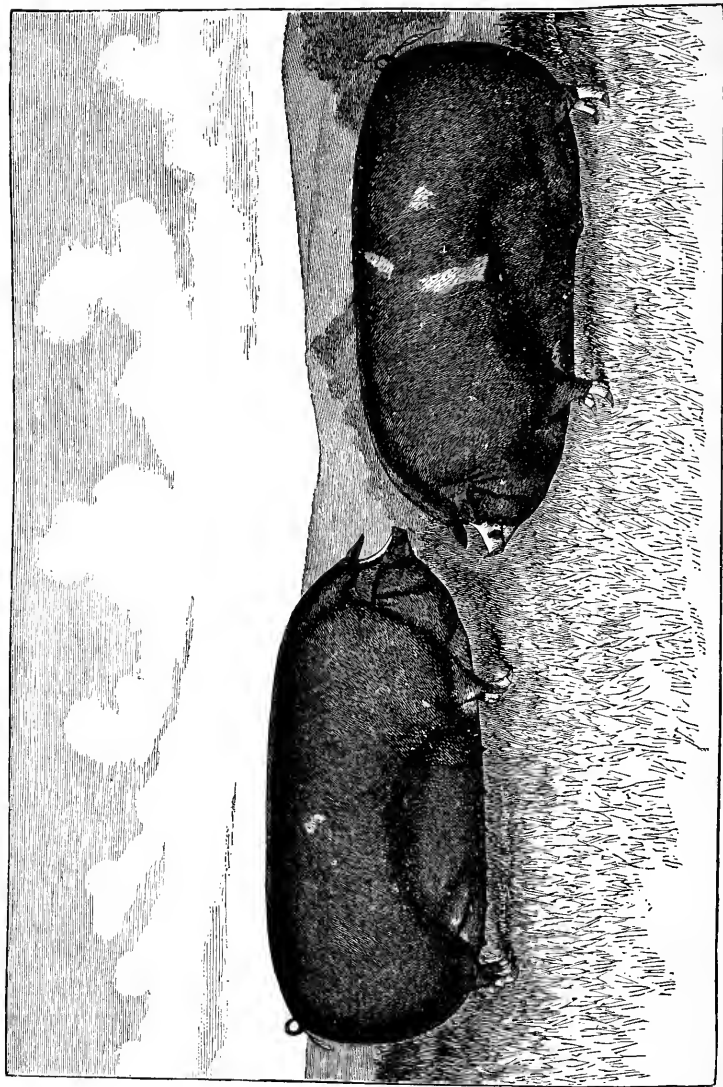
CHESTER WHITES, BRED BY BENSON, MAULE & CO., PHILADELPHIA, PA.

They are gentle, quiet, easily kept, and may be fattened for the market at almost any age.

**Description.**—This breed may be described as follows: A short head; broad between the eyes; slightly dished face; medium sized ears projecting forward and dropping at the tips; body long and particularly deep; back broad and straight; hair heavy, generally wavy, and snow white; skin soft, white, and thin.

The Chester Whites are a prolific breed, and make excellent mothers. In breeding, it is always best to permit the animals to attain a good size, in order to keep up the large size and prevent the prominent characteristics of the breed from deteriorating. These hogs always give good results when either kept pure or crossed on other breeds.





POLAND-CHINA HOGS, "JENNIE LIND" and "CHIEFTAIN."

Winners of *Stock Journal Challenge Pitcher* at Fat-Stock Show, Chicago, 1879 and 1880. Property of J. A. Countryman, Rochelle, Ill. 1206

## POLAND CHINAS.

**T**HE Poland China breed seems to divide the honors with the Berkshires at all the fairs in the great corn-growing States; it being in many cases the most numerously represented of all the breeds. There has been much controversy concerning the origin of this breed of swine, which is variously known as the Poland China, Magie, Warren County, Butler County, and by some the Miami County breed. In discussing this point, a high American authority says:

"It unquestionably originated in the Miami Valley of Southern Ohio, and was the result of crossing several distinct breeds, and of long-continued selection with a view to producing great fattening qualities and early maturity, as well as great size; and while there is still a considerable lack of uniformity, it has clearly become an established breed. The color is black, with irregular white spots, the black largely predominating; and some of them with white markings, almost identical with those of the modern Berkshire—a circumstance which sometimes leads to a suspicion of a recent Berkshire cross. But this suspicion is by no means warranted by the facts, as some of the purest-bred specimens we have ever known were so marked.

As a breed, they are larger than the Berkshire, more quiet and sluggish in their movements, heavier in the jaw and flank, and do not stand up so firmly upon their feet. In some cases the ears are rather large and pendulous, but in the herds of a majority of good breeders of to-day, the ears, while always drooping, will be found quite small and thin. The head and snout is shaped much like those of the best-bred Berkshires, although there is perhaps more of the "dish-face" tendency in the latter than in the former. This is the popular breed among general farmers all over the West, and its advocates claim that its quiet and contented disposition make it the best breed in the world for converting corn into pork and lard."

The National Swine Breeder's Convention, after a full and free discussion of the subject, decided upon the present name, Poland China, by which this breed is commonly known and accepted throughout the country, it having several years since become an established breed. It is claimed by some that for more than thirty years no new blood has been introduced into this breed, and that no effort has been made to obtain a new supply of the blood of breeds from which it originated, while at the same time efforts have been made towards its improvement by careful selection in breeding.

The swine are strong and hardy, fatten well, and at ten or twelve months will sometimes dress 350 pounds. They will weigh from 450 to 700 pounds when from eighteen to twenty months old, under proper management, hogs having been raised that weighed at maturity 900 pounds or more.

**Description.**—The Poland Chinas have long, deep bodies, broad, straight backs; large, square hams and shoulders; short heads, wide between the eyes, drooping ears; thick necks and large jowls; short, well set legs; hair fine. In color they are spotted or dark; the black with small white spots scattered more or less over the body are considered the most desirable. They are naturally very docile, and make excellent mothers. In fact, they seem to combine the good qualities of both large and small breeds.

## CHESHIRE.

**T**HE Cheshire is purely an American breed, and is regarded by many as only a modified Yorkshire. It originated in Jefferson County, New York, and is known also in some localities by the name of the Jefferson County breed. These hogs are excellent for fattening exclusively in the pen. The flesh is fine grained, while the carcass has a small amount of offal in proportion to the amount of pork it affords. A western breeder of experience states that for seven years he had these hogs without introducing any new blood but what was supposed to be pure, and that he produced all the different types of the Yorkshire, from the large to the Lancashire Shortface.

The white color was firmly fixed, and he never knew a Cheshire boar to get a pig that had a black hair on it, although they were bred to sows of all breeds, including the purest Essex. Another peculiarity he watched with interest was the frequent appearance of blue spots in the skin of the purest and best bred specimens. This peculiarity sometimes disappeared for one or two generations, and would again crop out even stronger than ever. The type which he finally succeeded in establishing upon the Cheshires, as bred by him, was the identical size, form, and quality of the approved medium Berkshire. Indeed, so marked was this resemblance in all things but color, that they were often called white Berkshires.

A new interest is being taken in this breed in some sections at present, they being bred more extensively than formerly.

**Description.**—These hogs are pure white in color, with thin skin, and usually thin hair, showing a pink color through the hair. The snout is usually rather long, but slender and fine; the jowls plump, ears erect, fine, and thin; the shoulders wide, the hams full, and the body long and deep. As compared with the Chester Whites, they are nearly as large, with finer bones.

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## ESSEX.

**T**HIS is one of the oldest English breeds of swine. The first improvement on the Essex was made by Lord Western, who devoted much of his time to the cultivation of live stock. While traveling in Italy, he saw for the first time, and greatly admired the Neapolitan breed of swine, there found in its greatest purity in the peninsula between the bay of Naples and Salerno. He purchased a pair of the best specimens from which he bred in-and-in until there was danger of the breed becoming extinct. He then used the Essex and, as some suppose, the Berkshire and Sussex sows, in crossing with the Neapolitan, the results of which he gives as follows:

"I have so completely engrafted this stock upon British breeds, that I think my herd can scarcely be distinguished from the pure blood of Neapolitans."

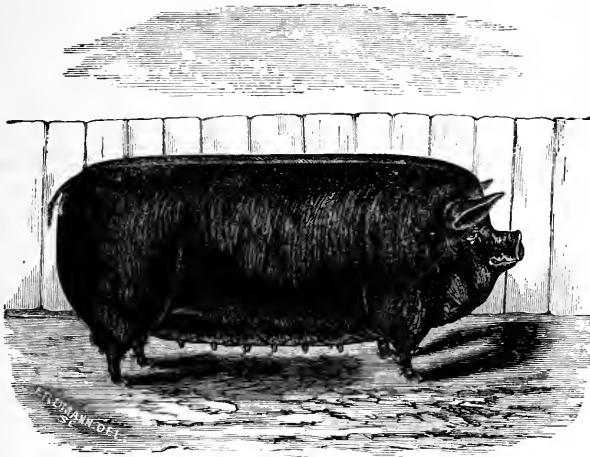
These pigs had great success at agricultural fairs, but as Lord Western bred exclusively from his own animals, his stock soon began to degenerate in size, muscle, constitution, and fecundity; and while the result of his careful experiments in breeding was a benefit to the surrounding country by the Essex cross, his own particular herd degenerated greatly. At this period, the best of the male animals from Lord Western's stock were bred by others to strong and vigorous Essex sows, carefully selected, and from this source originated the famous Improved Essex breed.

These swine are very popular in England, as well as in this country, being everywhere regarded as a valuable breed, whether maintained in its purity, or used in crossing upon inferior swine.

**Description.** — Color pure black, any white or spots of other color being inadmissible; they have a short dished face, broad between the eyes, ears small, soft, and standing nearly erect while young, but coming down somewhat as they get older; jowls full; neck short and thick; shoulders short from the neck, but deep from back down; back broad and straight. The body should be of medium length, broad, deep, and straight, with heavy hams; bones fine, but sufficiently strong to support the body; skin pliable; hair fine and soft, and not very heavy; no bristles; legs short and fine, but straight and set wide apart; hoofs erect; size medium.

When matured, the improved Essex will weigh from 300 to 400 pounds. They mature early, are prolific, and possess great vigor of constitution. The pork is of fine quality and flavor, having a good proportion of lean meat. They are good graziers, doing well where there is a plenty of grass and pure water, and will endure a hot climate better than many breeds. Mr. Joseph Harris, author of a work on swine, says of them:

“No hog cholera or similar disease has ever affected my herd. I have now over three hundred hogs, and I attribute their health and freedom from all disease in great part to the fact that the herd is summered on grass.



ESSEX SOW, "BLACK PRINCESS."

The Essex are so *quiet*, so refined, so docile, that they will keep fat on grass, I can rarely afford my hogs the luxury of a clover pasture. Those farmers who have plenty of clover, could not do a more profitable thing than to keep plenty of Essex swine. In sections liable to visitations of hog cholera, my plan would be to keep Essex and their grades, and feed them largely on grass. I am confident that we could raise healthier, better, and cheaper hogs by the introduction of more Essex blood, and by feeding more grass and clover. The subject is one of national importance.

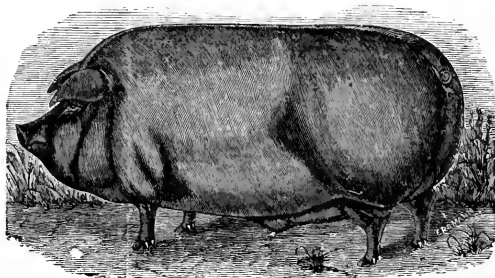
If I were not the owner of a single Essex hog, I would say that I believe there is no breed of hogs whose general introduction would prove so immediately beneficial and profitable as the Essex."

In England these hogs are marketed in great numbers when from five to eight months old, for light family pork.

## JERSEY REDS.

**T**HESE swine have been bred in some portions of New Jersey for more than fifty years, although their origin is not positively known. It is claimed by some that the breed is derived from an importation from England in 1822, by a Mr. Kelsey of Long Island, N. Y., and that moving subsequently to Montgomery County, and these pigs finding a favorable reception, they spread from thence to various States of the Union. However, this may be, it has become to be an established breed, and has many excellent qualities, among the most important of which are unusually heavy weights attained at small cost; the live weight of full-grown, well-fattened barrows generally running from 600 to 700 pounds, and not unfrequently to 800 and even 900 pounds; sows at maturity reaching from 500 to 600 pounds.

Both sexes possess very hardy constitutions, the males being exceedingly vigorous, the sows prolific, and such good nurses as to usually rear a numerous offspring. In this connection, it is said that they are almost entirely exempt from the mange. With respect to their fattening qualities;—the pigs grow very rapidly, weighing at four months, when well fed, from 120 to 140 pounds, and at a year old, 350 to 400 pounds. When put up to fatten, at sixteen to eighteen months of age, they have been known to gain from two to three pounds per day till ready for slaughter. A recent writer in the *Swine Breeder's Journal* says of them:

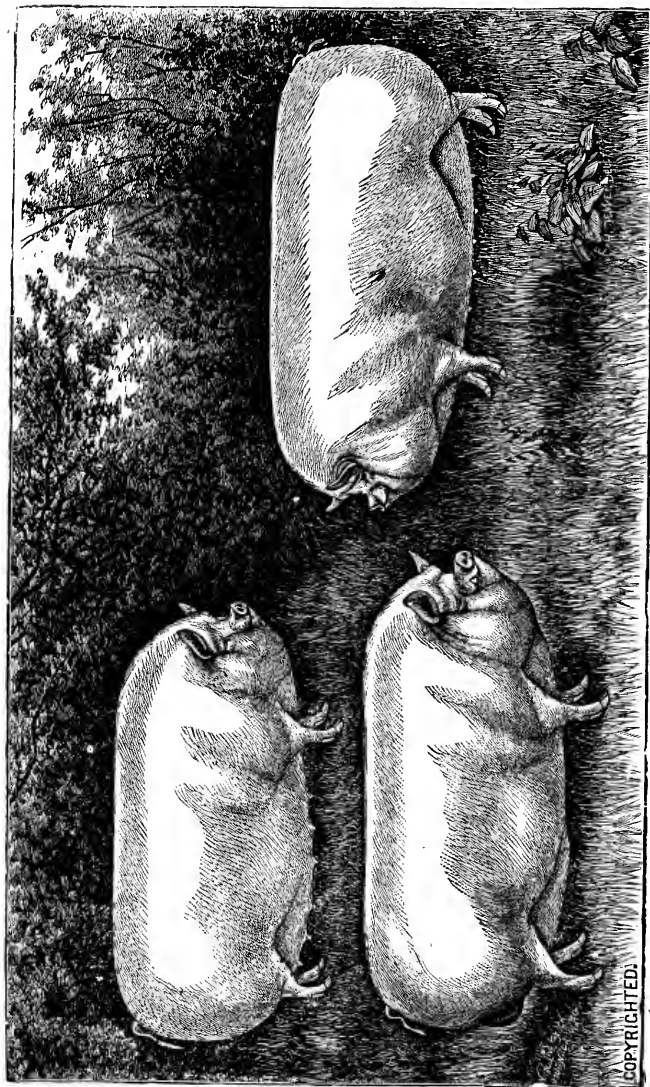


JERSEY RED.

“Jersey Red swine were most probably descendants of the old Red Berkshire, retaining some of the characteristics of that breed as it existed some thirty years or more ago, when the white markings were supplied by red. They had been improved, as all other distinct breeds were, by careful selection by the farmers of New Jersey, until they had new-acquired qualities as distinct as those of the Essex, Suffolk, or any other well-known breed with marked and fixed traits. The prepotency of the full-blood Jersey Red was such as to appear and generally prevail over the peculiarities of other breeds with which it is crossed, a fact which seems to support the belief that the Jersey Red of to-day is a lineal descendant of the famous old Red Berkshire, which all breeders will understand is very different from the trim, black, restless Berkshire of the present day.

It is a fact that many farmers of New Jersey, after trying other well-known breeds, have returned to the Jersey Reds as the best and safest for the pork raiser. The characteristics of the breed are, as described by the oldest and largest breeders, a good coat of fine red hair, occasionally interspersed with a fleck of black; broad faces; thin, pendant, or wilted ears; good shoulders; large developed hams; broad, straight backs, and excellent middle pieces,





**SMALL YORKSHIRES, "MODEL QUEEN," "IMP. KING JOHN," "ROYAL QUEEN."**

Property of Geo. W. Harris, "Ridge Farm," Morrisania, N. Y. (Formerly owned by Col. R. Hoe, "Brightside Farm," Morrisania, N. Y.)

the whole supported by fine symmetrical legs, with which they rise and travel with apparent ease, even when well fattened, and very seldom showing lameness, which has proven a serious objection to many other breeds. They are apparently mange proof, and fatten at any age from pighood up, until exceedingly heavy weights are attained; good feeders, making them net from 300 to 400 pounds each when from seven to ten months old, and from 500 to 900 pounds each when from one year to twenty-two months of age.

One Jersey farmer raised and slaughtered during the past sixteen years 463 hogs about twenty-one months old, that averaged 538 pounds, and dozens of crops of pigs nine months old dressed 300 to 375 pounds average.

The most notable qualities of the Jersey Red are healthfulness and docility. It was these traits that induced me to try them, preferring, like others, a hog not so liable to cholera, even if not so handsome as some fancy breed. They are also very easily cared for in consequence of their remarkable docility—a trait which seems to show that they are the descendants of a breed well cared for. But their fecundity is also remarkable. Litters are rarely below ten pigs in number.

The Jersey Reds now begin to be sufficiently well known to make their own way into public favor. Practical farmers who have tried them find them very desirable for crossing with smaller breeds. In nearly every case where a practical hog-raiser has tried them, he has expressed surprise that the breed has not been better known and introduced before."

The illustration of this and the Essex variety are made from photographs of animals imported by Benson, Maule & Co., Philadelphia, Pa., and are good representations of these breeds. The Jersey Reds vary somewhat in color, in some instances being of a dark red, and in others of a sandy color patched with white. The color preferred is the red. The head should be small in proportion to the size of the body; body long; ears large and drooping; jowls large. They are large boned, large framed hogs, and excellent feeders.

**Duroc Swine.**—There is another breed of red swine known as the Duroc, and considered by some to be identical with that of the Jersey Red. They are, however, regarded by many as a distinct breed. It is quite probable that the Jersey Reds and Durocs have their origin in the old time Berkshire, which fifty years ago were of a sandy color marked more or less with black. These hogs attain great weight, breed with more uniformity, and are more fine in some of their points than the Jersey Reds, which they closely resemble.

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## YORKSHIRES.

**T**HE old, original Large Yorkshire was a very coarse animal, requiring a long time to arrive at maturity, and for this reason, when compared with the Improved Yorkshire, was an unprofitable animal. The first steps taken in the right direction for improving these hogs seem to have been by crossing with the White Leicester, a large breed, with much finer points than the former. Sidney says of the breed thus improved:

"These improved Large Yorkshires are principally bred in the valley of the Aire, in the neighborhood of Leeds, Keighley, and Skipton. They are in great request as breeding stores, and purchased for that purpose for every part of the United Kingdom, as well as for France, Germany, and the United States, at great prices.

These pigs can be fed to 60 stone, of 14 lbs., dead weight, or 840 lbs. The Prize Boar at the Royal Agricultural Fair at Chester weighed, alive, 1,232 lbs. The Prize Sow at the Royal Fair at Warwick, 1,204 lbs. At Northallerton were a fine lot of large sows. There were at least a dozen, each of whose live weight would not be much less than half a ton (1,120 lbs)."

Pigs of this breed have been known to dress at slaughter 225 pounds when less than seven months old, and 489 pounds at twelve months of age. There are three classes of Yorkshires, the large, middle, and small. The first, as has been already stated, attains great weight, while the middle reaches about the size and weight of the Berkshire. The first are invariably hard to fatten, especially when young. The second originated by a cross between the large and small, the latter being of fair size.

**Small Yorkshires.**—These swine are noted for fine points, they having exceedingly fine bones, small ears, short heads, dished faces, short legs, and produce meat of a fine quality, while they fatten very readily. We are indebted to Mr. George W. Harris, of Morrisania, N. Y., for several years a successful breeder of these hogs, for the following description of the breed:—The head is small, with great width between the ears; face short and well dished; snout very short and broad (not pointed), jowls large and deep; ears small, thin, and erect; neck short, the head, as it were, being set in the shoulders; body large; back broad and straight; chest deep and full; ribs well sprung, giving great width of body; hams broad, deep, and projecting well back; shoulders broad, deep, and square; legs short, and set rather far apart; bones fine and strong, an animal of this breed being very rarely found sprung in the legs.

They show a peculiar fixedness of character, reproducing their like with perfect uniformity. We have noticed that if a pure-bred Small Yorkshire boar be crossed with a sow of any other breed, the progeny will invariably show much more of the characteristics of the sire than the dam; while if a female of the grade thus produced be crossed with a pure-bred Small Yorkshire, the resulting progeny will deviate but little in appearance from the pure-bred animal. But what seems remarkable is the fact that if a pure Small Yorkshire be crossed with the Poland China, the Berkshire, or any other black-haired breed, the pigs will almost invariably be pure *white*, without a black hair upon them, which shows the extraordinary prepotency of this breed.

They are very quiet in disposition, not giving to roaming, not liable to break through fences, and are absolutely unable to get over a fence having a height of from eighteen inches to two feet; they are consequently more easily fenced in than some of the more ranging breeds. They show a tendency to early maturity, fatten readily, and have a small proportional amount of bone and oil. The flesh is of a fine texture and delicate flavor, being much superior to some of the large, coarse breeds. As nurses, I have found them to average as good as other breeds, for, though they do not probably furnish as much milk as the larger and coarser breeds, their pigs require so much less to keep them thriving, that I never yet had a Yorkshire sow that did not furnish milk enough to keep her pigs fat and plump.

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## SUFFOLKS.

**T**HESE swine are considered by many at present as only a variety of the Yorkshire breeds; however this may be, it is one of the old English breeds, and has been regarded with much favor in making what is commonly termed a "market pig." The Suffolk is not a large breed, it weighing a hundred pounds or something more at the age of four or five months. July pigs, well fed upon milk, ground corn, and oats, or barley meal and potatoes, may easily be made to attain the weight of 120 pounds by Christmas, the season when there is a brisk demand for such pork.

**Description.**—The description of the Suffolk breed is given in the Swine Register as follows: "Head small, very short; cheeks prominent and full; face dished; snout small and

very short; jowl fine; ears, small, thin, upright, soft and silky; neck very short and thick, the head appearing almost as if set on front of shoulders; no arching of crest; crest wide and deep; elbows standing out; brisket wide, but not deep; shoulders and crop-shoulders thick, rather upright, rounding outward from top to elbows; crops wide and full. Side and flanks—ribs well arched out from back, good length between shoulder and ham; flank well filled out and coming well down at ham. Back broad, level, and straight from crest to tail, to falling off or down at tail; hams wide and full, well rounded out; twist very wide and full all the way down. Legs and feet—legs small and very short, standing wide apart, in sows just keeping the belly from the ground; bone fine; feet small, hoofs rather spreading; tail small, long, and tapering. Skin, hair, and color—skin thin, of a pinkish shade, free from color; hair fine and silky, not too thick; color of hair pale yellowish white, perfectly free from any spots or other color. Size small to medium."

The objections urged by some breeders against the Suffolk are, that they have too much fat, and on account of this tendency to fatten, the sows are not as prolific as they otherwise would be, while they are poor nurses; also that the young pigs are not as strong and vigorous as some breeds, and that their tender skin and thin hair disqualifies them from enduring the cold and exposure of a rigorous climate, while at the same time it blisters and cracks in the hot sun. Still, they are held in very high esteem, and are increasing in favor in many sections.

**Breeding Swine.**—We have already in this work discussed so extensively the value of thoroughbred stock in improving the common stock of the country, that it seems scarcely necessary to allude to the subject in connection with swine. Whatever advantages may be gained by infusing new and pure blood into one class of domestic animals, may be gained in a corresponding degree in others. The standard breeds of swine have been established by a long and careful system of breeding, which has developed, through judicious management and selection, the desirable characteristics, such as early maturity, readiness to fatten, the form that shall produce the greatest amount of marketable pork with the least amount of waste, etc.

While raising thoroughbred pigs for the butcher may not always be the most economic and profitable course for the average farmer to pursue, still, thoroughbred stock will be necessary to improve those of inferior quality, and secure as many of the desirable qualities as practicable. It costs no more to maintain a good animal than a poor one; in fact, the better the breed the more rapidly they will mature and grow; hence, it costs considerably less to prepare the improved breeds for the market, than the coarse, slow maturing, common stock, and they are consequently more profitable, since they bring a larger return for less outlay.

Pure bred animals also possess the ability to transmit their qualities to their offspring; hence, if a thoroughbred male be crossed with a good grade or sow of large size, we have a progeny that will possess many of the essential characteristics of the former, combined with the vigor of constitution and digestive powers of the latter. In grading up swine, it will be seen that it will be necessary to use only thoroughbred males, selecting the best sows of grades or common stock.

With regard to the selection of a breed, we would not recommend that which has been bred so fine that it has become delicate, and degenerated into effeminacy. Such may do very well for the show pen, but for use, we want a breed that is hardy, with bone and joints fine to be sure, but sufficient to carry a good weight. Some breeds of swine have bred, in-and-in, so fine that the useful points have been bred away, and given place to those of the fancy order. As a general rule, there is much advantage gained when extremes meet, resulting in a medium or middle ground, and this is a safe principle to abide by in both individuals and breeds. The able editor of the *National Live Stock Journal* says on this point:

"The extremes in swine stock — the old sorts, without any refinement, and certain specimens of the new sorts, so refined by breeding selected specimens together, and again interbreeding these, that no stamina remains — represent two kinds of property nobody wants — at any rate, nobody wants either kind if they are thoroughly conversant with swine, the uses to which they are put, and the reason why the hog yields a profit upon his keep.

The idea of delicacy in the hog never entered the mind before he was very materially improved by the refining processes which come through careful selection, sorting out as breeders those with fine bone, ear, and hair. The result in these cases has been very gratifying to those who breed pigs with somewhat the same views that are held by the dog fancier, who breeds the black-and-tan rat dog till the leg and jaw of the dog are not much larger or stouter than the leg and jaw of the rat. This effeminate breeding, of course, refines away the stamina and courage, and such a dog is no equal for the rat, who has, through natural selection, retained his size and vigor, while artificial selection has bred the dog down below the point of usefulness, with neither courage nor other essential remaining.

The hog should not be bred away from the usefulness for which he is kept when men are not led away by an overstrained fancy. In the days when Suffolks held a position second to none, some bred them so fine that the sows would only drop four to six pigs at a time; and if the weather was cool, say in March or early April, to insure that the pigs got hold of the teat, it was necessary to stay with them on the farrowing night, taking the pigs away, one by one, and wrapping them in a blanket till dry, to guard against a chill, and to make sure that they had strength to hold on to the teat when this was offered. They were like infants from very delicate parents, exceedingly difficult to raise to an age when they would seem to take hold with any prospect of living and doing well. Up to this time they suffer, first with the chill of a cool atmosphere, then with blistering and cracking in the sun; next from bowel disturbance, if the dam be even moderately highly fed, and all the time, from a tendency to get feverish, refuse the natural nourishment, showing very rapid breathing, and dropping off in spite of all care, and apparently on very slight exposure.

Now, the hog of good weight may have bone and joint enough to carry him well, without this being objectionable in amount; yet, when the bone gets below this fair size, effeminacy has taken possession of the animal in every part, as the practiced eye will see at a glance. If at this point the breeding of the herd be changed, and the frames and soft tissues be stiffened up by a suitable cross, bad results may be avoided; but if the over-refining process be continued, the effect will be to destroy the value of the herd.

No man should make up a new herd, or add to one already upon his premises, from stock not entirely competent to be 'self-tenders.' At least to be such under circumstances where this is practicable. No man who wants a hog for profit will have his wants fully met until he gets such as are hardy enough to stand pretty severe cold, some neglect, and be quite ready to thrive with plain, even what would be rough feed for the exquisitely bred and pampered hog. The pigs of the stronger kinds, those with plenty of hair and not too fine bone, will survive, though they are farrowed in cold weather, and this, too, without extra care and nursing. More pigs will be dropped at each farrowing time, and it is safe to say that half a dozen strong, well-haired, thrifty sows will raise as many pigs in a season as will be saved and raised by ten sows if exquisitely bred and accustomed to close confinement.

Buyers should see to it that they do not buy from herds where it has been the practice to breed from very young sows and boars. Haste in getting progeny from pigs for which good prices have been paid, is highly censurable. A herd managed on this plan for a few years will dwindle, not only losing size, but becoming effeminate also. The strongest and most profitable stock to buy is found in those herds where the full-grown sows and boars are kept as breeders, and where all the breeding stock, as well as the pigs old enough to run with the sows, are allowed the full liberty of the pastures during the grass season, and plenty of liberty for exercise at all other seasons."

We prefer swine of medium size, and fineness of points, always combining with these a good constitution, early maturity, rapid growth, fecundity, hardiness, and a superior quality of flesh of both fat and lean. The flesh that abounds most in fat is best suited for salting and barreling pork, while such as give a greater amount of juicy, tender, lean meat, are best for hams and tender bacon.

**Selection of the Boar.**—Whatever the sow may be, the breeder should always use a thoroughbred boar for breeding purposes. A grade hog may perhaps look quite as well as the thoroughbred, but he will not transmit with certainty the good qualities of the breed, and hence will be totally unfit for breeding. What is termed prepotency is possessed only by *pure bred* animals, and hence the value of such for breeding. These qualities have become *fixed* by a long course of careful breeding, while in the grade there is no element of permanence in this respect. Having decided upon the breed, the next step is to select the individual animals. The boar chosen should have a strong, vigorous constitution. The masculine characteristics should be prominent, avoiding such as are of the effeminate order.

On this point, a prominent and successful breeder in the West says he prefers that the male used in breeding should be rather coarser than the average type of any given breed. Another gentleman distinguished for his success in swine husbandry, states that he would go still further, and apply the same rule to the selection of brood sows; that he has found that sows of a coarser, stronger type, were more hardy, more prolific, and better nurses, and that their pigs were usually better than those from sows of a finer, smoother, and more debelate make-up. The inherited health and constitutional vigor resulting from the mating of strong and vigorous parents, will be apparent not only in the number in the respective litters, but also in the size, strength, and qualities that go to the making of a pig that will be worth a good price all of the way from birth to maturity.

The early selection of the boar is especially desirable, for in this way there is a large number to choose from, giving the opportunity to select the best. In breeding for the general pork market, the selection should be very different from that for show purposes alone, in which case a delicate ear, fine tail, and a tendency to fatten rapidly, with other and less important marks, are matters of considerable importance. A natural tendency to fatness, and fatness in the fully developed state are essential in the show pig, but much of the high bred swine of the present day have as strong a tendency to fatness as is well in breeding animals, if large litters are to be obtained. An authoritative writer says on this point:

"The best show pig may come from the smallest sow in the herd, yet, as a rule, it is not wise to select breeders from that class. We want the most size in the shortest time; and, as stated, there are hardly any pigs in these days that do not inherit ample fattening proclivities, so that we can quite safely forego a little of the fat that we may secure in the prospective breeder roominess and tendency to growth. All litters, no matter how well bred, show variations at weaning time, and appearances indicate that we can know the best pig for future use, almost from the start. These appearances, however, are often deceptive, as we find a few months later. The best pig at weaning time may not do as well as expected during the next following three or four months; hence, it is best to watch the development, eventually choosing those having size, with greatest width, depth, and length, combined with the finest points."

In all cases individual merit should be combined with purity of blood and desirability of pedigree in the selection of swine for breeding.

Having once secured a good breed, or having obtained the desired qualities by judicious crossing and selection, every effort should be made to continue to improve it, always selecting those animals that show the best points, and fixing them by breeding only from such. This should always be combined with good care, for the best breed of animals that ever existed will soon degenerate if left to care for themselves, or neglected. Gentle and kind treatment

are of great importance in the management of the boar, inasmuch as his future disposition, whether kind or ferocious, will depend very much upon the management and treatment he receives at the early period of his existence. There should always be firmness combined with kindness, for these animals often become cross and even dangerous, unless managed in a common sense manner.

**Selecting and Rearing Brood Sows.**—While it is not as essential that the sow should be thoroughbred as the male, in breeding for the pork market, yet it will always be found the best practice (since the results will be correspondingly better) that the best types of animals be selected for breeding in both male and female; therefore whether common native sows or grades be used, the best specimens should always be chosen for breeding, not only in constitutional vigor, but in form, aptitude to fatten, early maturity, tractability, etc. The following sensible advice on this subject, from a prominent agricultural journal, will be found of value to swine breeders generally; and since it accords so precisely with our own views, we quote it entire:

"A brood sow should be a good milker. However good in other respects, if deficient in this, she should hardly be retained as a breeder. An abundance of milk for the first eight or ten weeks of their existence is the best preparation young pigs can have to fit them for profitable growth in after life. It is not always possible to decide with certainty whether or not a young sow will prove to be a good milker; but as with cows, so with pigs, we may learn from observation and trial to know in some degree, judging from their general appearance, what to expect.

Much will depend upon the dam and grandam in this regard. Milking qualities in swine are as surely transmissible to progeny as in cattle. Thus it is true of swine as of cattle that this trait may be greatly improved by selecting only good milkers for breeders, as well as by feeding them when young with a view to their development as milk-producers, rather than as fat-producers. For this reason spring and early summer litters are usually the best from which to select young brood sows. They can be kept through the summer almost entirely on grass, which, if abundant and in variety, will make them grow nicely, and, at the same time, the exercise required in grazing will keep them in good health and thrift. By the time the cold weather comes on, and corn is to be fed, they will have become nearly old and large enough for service. But even after this, continued care should be taken that too much corn, or other fat-producing food, should not be given them. We must, however, bear in mind that at this period all animals naturally lay up fat, which afterwards goes to enrich the milk. Hence, while they should not be allowed to become over-fat, they should yet be so fed as to supply this demand of nature, and to retain the general health and vigor of the system.

When they have dropped their first litter, the most they will need for the first five or eight days will be cooling drinks, and very little rich food. Wheat bran scalded, and then thinned with cold water, to which may be added a handful of ship-stuff or middling, may be given. In ten days or two weeks the richness of the food may be gradually increased, great care being taken, however, both as to the quality and quantity, that these changes may not injure the health of the sow, or so affect her milk as to cause scours in the pigs. It is a very common mistake in feeding sows having young pigs to give them too much strong food when the pigs are quite young.

It is not until the pigs are some three or four weeks old that they really begin to tax the sow heavily. Then it is that the sow should be liberally and regularly fed on good, nutritious, milk-producing food; and, at the same time, the young pigs should be taught to feed by themselves at a trough out of the reach of the sow. If thus managed, both sow and pigs are benefited. The strength of the former is kept up, and her disposition to produce an abundance of good rich milk so encouraged as to fix this as one of the best traits of her

nature; while the pigs, by the extra feed given them, make a corresponding rapid growth, and that at a comparatively small cost.

Young sows brought up in the manner suggested, and thus cared for with their first litters, may be depended on to do as well, or better, with their next, provided they have anything like fair treatment. In case, however, a sow fails to prove herself a good milker, after a fair trial, she should be replaced by one of better promise, unless, for some special purpose, it is thought best to retain her."

The sow should always be gently and kindly treated, and especially during the period of pregnancy. Such sows can always be more easily managed and cared for at the time of farrowing.

**Age for Breeding Swine.**—It is not only highly important that the boar should be a pure-bred animal, and that both male and female be the best representatives of the breed to which they belong, but that they should be allowed to attain a suitable age before being used for this purpose. Many farmers make a grave mistake by permitting animals to breed before they have become fully developed. By so doing, good results cannot be obtained, for half-grown parents cannot, in the nature of things, produce large, strong, and vigorous offspring. Pigs from full-grown and strong parents will, with the same care and food, produce a larger amount of pork than those from immature ancestors, since they will be larger, more vigorous, and take on flesh more rapidly. If, while growing, the sow is obliged to yield much of her strength and vitality to the production of her offspring, her growth must of necessity be checked, while she will be unable to impart that vigor of constitution, and a tendency to rapid growth to her young, that she would if fully matured before breeding.

Weakness will result as a natural consequence in breeding from immature parents, and weakness in the parents denotes still greater weakness in the progeny, and consequently degeneracy. We believe it is better for sows not to have pigs until they are fourteen or sixteen months old, than much earlier, although some breeds mature much earlier than others.

If the boar should be kept until he is a year old before being put to service, and allowed to serve but a limited number until he is a year and a half old, his offspring will be much stronger than if he had been used for this purpose younger.

A boar may be kept for breeding until he is five or six years old. He will, however, get much better pigs after he is two years old than before that age. Boars are frequently apt to get cross as they grow older; in such cases they should be castrated and fattened. A sow will remain prolific until she is seven or eight years old. Old sows will, as a general rule, bear stronger and better pigs than young ones, and will take better care of them, and have a better supply of milk. When once a good breeding sow is obtained, proving a good mother, she should be retained as long as possible for breeding purposes, as young sows are apt to be poor mothers. The practice with many farmers of discarding the old sows and supplying their places from the young litters is very unwise, providing the old ones are of equal merit. Young sows, however, should be well fed before being bred, in order to bring as strong and vigorous pigs as possible.

**Period of Gestation in Sows.**—The period of gestation in sows is from a hundred to a hundred and twelve days. There is a variation sometimes of from twenty to thirty days, but this is the exception. Young or weak sows will generally carry their young a shorter time than older and stronger ones. The best time for spring pigs to come is in April, and fall pigs in September. Where two litters are raised from a sow during the year, the first litter should come as early as March, so that the next litter may come early enough in the autumn for the pigs to be weaned before cold weather sets in. The sow should be kindly treated while carrying her pigs. It is well for the breeder to always keep a memo-

random of the date of service, that he may know when to look for the appearance of the litter.

**Managing Brood Sows.**—When farrowing occurs in cold weather, the sow should have a place artificially warmed. A stove located near the pen so that its heat may be communicated to it will be necessary under such circumstances. A temperature of not less than sixty-five degrees will be necessary until the pigs are properly dried off, and will take the teat. Young pigs are very tender, and will soon get chilled. It is well to provide warm, dry, well-ventilated quarters for the sow, where she can be by herself, at least two weeks before the time of farrowing. It may sometimes be a good plan to run rye straw through the feed cutter before putting it in the breeding pen. If, however, the sow is isolated in season, she will have sufficient time to break up the straw and make her own bed. Care should, however, be used not to give her too much straw, or the pigs may be smothered in it. To avoid all danger from the pigs being chilled, where no stove is provided for warming the breeding pen, a woolen blanket may be placed carefully over the sow as soon as she has lain down, and there are symptoms of approaching delivery. The attendant should of course stay by, and see that the pigs are kept constantly covered by the blanket, as good care at this time pays well. After the pigs are dried off and have taken the teat well, there will be less danger of their getting chilled. It is a good plan to gentle the sows before farrowing by accustoming them to be approached and frequently handled. Such sows will be more quiet and can be more easily controlled or assisted than those that are wild and nervous. If necessary to check a costive tendency, feed the sow roots, green clover, oil meal, bran slops, etc., for a few days before the pigs arrive. Old and experienced breeders say that a dose of castor oil, even, is not needed in one case in a hundred.

After farrowing, there should be undisturbed quiet and rest for from eight to ten hours. A little salt in the slop, water, or gruel is generally relished at this time, but the drink first allowed must not be sufficiently cold or in such large quantities as to produce a chill. Breeders of large experience recommend scalded shorts as a safe diet for a week or ten days after parturition, to be followed by the addition of a portion of corn meal, seasoning it by mixing a little salt. It should be remembered that during the period of gestation the health of the sow largely influences the health of the pigs. Improper food is frequently given, and too much of it at such times. Indigestion in the sow will produce this difficulty in the young pig. Improper food, such as too much sour slops at the time of farrowing, will derange digestion, unless the sow has access to earth, ashes, charcoal, and similar substances to neutralize the excess of the acid. Sows, when carrying their pigs, should be occasionally supplied with charcoal and ashes, and if kept in a pen, with green food or sod also. If the blood becomes impure through improper food, these impurities will be communicated to the milk, and hence will affect the health of the young pigs.

When left to herself in the selection of food, the sow will instinctively so temper it by seeking alkaline earths, charcoal, etc., in connection with grain and other food, as to prevent acidity and fermentation, which are the two things more than all others that will damage the milk, producing indigestion and a loose condition of the bowels of the pigs. Never allow the sow and pigs to have access to, or lie in a manure pile. Basement stables are decidedly objectionable in this respect. A farmer who permits his sow and her litter to lie in a manure heap need not be surprised if one-half of the litter die, and the rest fail of being healthy. The same may be said of permitting them to lie in a damp bed.

**To Prevent Crushing Young Pigs.**—In order to keep the sow from crushing the pigs between herself and the wall, a rail or other protection should be placed around the inside of the pen eight or ten inches from the walls, and about six inches from the floor. Sometimes a shelf or piece of scantling is placed around the walls of the breeding pen.

When but little straw is used, this affords a complete protection for the pigs, as it gives the opportunity for them to escape if any should be behind her when she lies down. Such a shelf is easily arranged, and may be removed, if desired, when the pigs are a week or two old.

**Preventing Sows from Eating Pigs.**—Sometimes the sow will eat her pigs as soon as they are born. This extremely unnatural tendency is the result of a feverish condition of the sow at the time of farrowing. A feverish condition is produced by a constipated condition of the bowels. This condition may be obviated by feeding light, sloppy food, roots, scalded bran with oil meal, etc., for a few days previous to farrowing. Give her also salt meat for three or four days before farrowing, such as salt pork, bacon, or fish, in small bits, and as much as she will eat every day. This will appease her appetite for flesh, the salt is laxative and the sow has no desire for fresh meat. If there seems to be a feverish, restless condition, give her a large quantity of lukewarm water or gruel slightly salted; this will usually result favorably, the sow lying down quietly, and remaining so until through farrowing. An extensive western breeder says on this point:

"The eating of pigs results from an unnatural appetite on the part of the dam, which is caused, usually, by a feverish condition of the system. It does not often become a confirmed habit. We have frequently known sows that had eaten up a whole litter of pigs, to afterwards become careful mothers. On one occasion, we had a very valuable sow that was about to farrow. After she had made up her nest, we noticed that she was costive, feverish, and uneasy. As soon as the first pig was dropped, she got up, and greedily devoured it. She then lay down again, and a second pig was dropped, with the same result. She appeared perfectly frenzied, and eagerly devoured every particle of straw that had come in contact with the liquid that escaped her when giving birth to the pigs. We then hurried off, and brought a large pailful of tepid, salty water, which was placed before her. This she drank as greedily as she had eaten the pigs. She then lay down quietly, dropped eight more pigs, without stirring from her nest, and raised them all."

When the diet of the sow has been properly managed, during the time of carrying her pigs, occasionally giving charcoal and ashes, and green food or sod when confined in a pen, there will be little danger of her eating her pigs. Whenever any sow eats her pigs a second time she should be rejected as a breeder.

**Care of Young Pigs.**—It is important to have young pigs become accustomed to eating something before they are a month old, instead of having them depend entirely upon the milk of the dam until the period of weaning, as the sudden change of food at that time, and want of milk will be liable to retard their growth. If properly managed, their growth should not be checked for a single day. Mr. Corbin, the author of a work on Swine Husbandry says:

"As to the care of pigs, there is no danger of forcing them along too fast on milky slops and clover. If they gain a pound a day it should be very gratifying; and if they do less, their owner may conclude the maximum of gain is not being attained, and profitably endeavor to find out, as soon as possible, the reason why."

Pigs should be allowed plenty of skimmed milk and buttermilk, mixing a fair proportion of corn meal mush, or wheat and rye screenings ground together. They should also have a plenty of grass as soon as they will eat it. The meal for young pigs should always be thoroughly cooked, as it is then more nutritious and easily digested. Raw, or half cooked meal does not digest readily, and when fed to young pigs not accustomed to it, it will be very liable to bring on an attack of the scours. The pigs should have a little trough by themselves to which the sow cannot have access, that they may be taught to eat.

If by mistake more food is given than can be eaten, it should be removed, as it will become filthy if left, and unfit to be eaten by them. Remove it in some way, that the troughs

may be clean when they are fed again. Some farmers do this by letting in a sow from the yard to eat what the pigs may leave. Little and often is the best rule for feeding young pigs. The younger the pigs the oftener should they be fed. When they are weaned at six weeks old they should be fed five times a day for the first two weeks following. If the sow has no milk at first, the pigs must be fed by hand until the mother is able to supply them. If she is fed with sloppy food she will be likely to have milk in two or three days, if not before. In such cases the little pigs must be fed several times a day; give them all they will eat, but no more. Milk from a cow that has recently calved is best. It may sometimes be necessary to add a little molasses. As the pigs increase in size, the quantity of food given should be correspondingly increased. When pigs are weak at birth, it is generally because one or both of the parents were too young to breed, or were diseased, not well mated, or because the sow had not been properly fed or cared for.

Young pigs thrive best that can have a yard or lot to run in, when the season is such that it is practicable; those that are closely penned for any great length of time cannot be expected to thrive well. The pigs should always be kept as clean as possible, and well ventilated. Dry earth is one of the best and most effective absorbents and disinfectants for pens; it absorbs the liquid manure, and adds much to the comfort and health of the pigs. The troughs should be scalded with boiling water occasionally. Pigs of the same age and size should be kept together as far as possible, but when this cannot be done, there should be an abundance of troughs provided, as the stronger ones will crowd the weaker ones away, and prevent the latter from getting a sufficient supply of food.

One important fact is clearly established in feeding animals, and that is, that the young of swine, as well as all other animals, will make a very much better gain from the food consumed, than older animals. Pigs at from ten to twelve months of age, if properly managed, will give an average of one pound gain in weight per day. This is a larger gain, in proportion to food consumed, than would be averaged in the next ten or twelve months.

**Weaning Pigs.**—Pigs are usually weaned from six to ten weeks old. At the age of two months their teeth are in a suitable condition to grind food. Spring pigs can generally be weaned a little earlier than those coming in the fall or early winter. As previously stated, they should be fed with milk and buttermilk, mixed with corn mush, ground wheat, and rye screenings, etc., before this period, in order to be kept growing well, and to obviate too sudden a change in food at the time of weaning. They should have grass also as soon as they will eat it. At the age of three months they may be fed on clover, and whole soaked corn. A breeder of swine, of several years experience, gives his views of weaning pigs as follows:

"The time of weaning depends somewhat upon circumstances, but generally at from eight to twelve weeks. If they have been early taught to eat, and have grown well, they may safely be taken from the sow at eight weeks old; but if they are small and poor, they may well be permitted to follow the sow two to four weeks longer. The sow will scarcely suckle them longer than eleven or twelve weeks. The time of weaning is simply a matter of convenience to the breeder. With proper care and attention a pig may be raised without ever sucking the sow at all, and they may be taken off at any age, provided that food of a suitable quality and quantity be furnished them."

It is a good plan to leave one or two of the smallest pigs of the litter with the sow for a few days after the others are taken off, in order that her udder may not become swollen or caked by the collection of too much milk for which there would be no escape, if all of the pigs were removed from her at once.

**Castration.**—Pigs not designed for breeding purposes should have this operation performed when about four weeks old, or at least two or three weeks before they are

weaned, as it is then less liable to interfere with their health and growth, than if delayed until after weaning. Besides it makes them smooth barrows if done at this age, and obviates the trouble of having a few months afterwards a miscellaneous number of boars on the premises, when there should be only carefully selected animals for breeding purposes. This operation is very simple. The pig may be held from the ground by the hind legs, by an assistant while the operator is at work, or on its back, with the head and shoulders between his knees and the hind legs held apart. With a sharp knife make a small incision into the scrotum, but of sufficient size to press out the testicle, cut the cord with a dull pair of shears to prevent bleeding.

Never jerk to break the cord, it is a cruel and barbarous practice, as the cord may better be severed by more humane means. Sometimes a little melted lard in which a little salt has been mixed is applied to the wound, but there will generally be no need of the application of anything. If on the second day, there should be considerable swelling, a little tincture of myrrh should be inserted into the cavity.

Mr. Coburn gives the following method of castrating old boars: "After drawing up one hind leg, and fastening it securely to a post or stake, fasten another rope around the lower jaw, back to the tusks, draw it tightly and fasten it to another stake; in this position the animal can offer no serious resistance. The cut should be low down, and as small as possible. The low cut will afford a ready means of escape for all extraneous matter, and allow the wound to keep itself clean, there being no sac or pocket left to hold the pus formed during the healing process. It is not best to perform this operation when the boar is very fat, or when the weather is too warm, as the risk is much greater.

**Spaying.**—This operation is sometimes performed on sows when about three months old, where large numbers of swine are kept. It is, however, a very delicate operation and should never be practiced upon any animal whatever, except by a person who perfectly understands the business and has seen it performed by a skillful veterinary surgeon. A recent writer has well said, "There are a thousand men who can do a tolerable job at castrating, to one that is competent to perform a spaying operation." We would not as a general rule recommend spaying, it is a cruel practice and attended with too much risk. There may be cases when it is desirable, and for the benefit of those who desire such information, we insert the directions for spaying small animals, which are given by Professor Law in his veterinary work. The animal should be sparingly fed on light food for several days before this operation is performed.

"The animal is stretched on its left side, the fore limbs and head being firmly secured, and the hind limbs extended backwards. The hair is shaved from the flank a little below the angle of the hip-bone, and an incision made from above down, extending to an inch in the pig or bitch, or sufficient to introduce the hand in the heifer. Then with the finger or hand, as the case may be, the womb is sought, backward at the entrance of the pelvis in the interval between the bladder and the straight gut. Being found, one horn or division is drawn up through the wound until its end is exposed with the round mass of the ovary adjacent. The latter is seized and cut or twisted off according to the size of the animal. Then the next horn and ovary are brought out, and treated in the same way. The womb is now returned into the abdomen, and the skin accurately sewed up."

There are other methods of performing this operation, but the one previously recommended is usually regarded as the best. An animal that has been spayed should be protected from the cold and storms, and lightly fed for a few days on moist, cooling food. Apply a little lard with which turpentine has been mixed for a few days afterward. There will be danger of trouble from flies, if spaying is performed in very warm weather.

**Fattening Pigs.**—The best method of fattening pigs is to commence giving them all they will eat while young; this will cause them to grow rapidly, and produce more pork for

the food consumed, than the practice followed by many farmers of letting the pigs go half starved for the first four or six months, thus stunting their growth until a special time for commencing to fatten them is decided upon. It should be remembered that it takes a certain quantity of food to supply the daily animal waste, besides maintaining the increasing growth. The young animal converts more of the food given into flesh than the old animal, because the waste is less in the former than the latter; while the demand for the building material for the bones, muscles, nerve tissues, etc., is greater in young animals than old.

It was formerly supposed by many that old animals would fatten more readily than animals that are young, but it will require no argument to prove the fallacy of this opinion, or to show that the best economy is to feed pigs all they will eat from birth, if the object is to sell the animals when fat. No animal should ever be permitted to lose flesh, at any stage of its growth, for it must of necessity be brought back at an increased expense of food over that previously given, to bring it up to the condition when it began to fail. It is now generally conceded that the most profitable time to fatten swine is when they are young, and that those who keep them to full growth lose much of the profit that would result from fitting them for market sooner.

A breeder of experience says: "The farmer who keeps a pig more than eight months loses twenty per cent.," and advises that pigs be fattened when they are six months old. Wintering hogs with a view of getting heavy weights is not to be advised, unless under exceptional circumstances. The expense of feeding is too great. Pigs weighing from 200 to 300 pounds will bring a higher price in any market than those of any other weight, while the pork from such animals is more tender, delicate-flavored, and much to be preferred for home use than that of the older hogs. Such hogs cut up better into hams, bacon, etc. It will cost much less to feed three pigs to a weight of 200 or 250 pounds, than it will to keep a hog until he shall weigh 600 or 750 pounds, besides the pig pork would bring a higher price in market.

The weight of the stomach of different domestic animals, in proportion to each one hundred pounds of live weight, is in the ox 3 lbs.; in the sheep 3 lbs.; while in the fat pig it is only .66 lb.; so that proportionately the weight of the stomach of an ox or sheep is about five times as great as that of a hog. Notwithstanding the stomach of the hog is comparatively so much smaller than that of the ox or sheep, he is a great consumer of food, and possesses the ability to eat, digest, and assimilate more nutriment in a given time in proportion to his size, than any other domestic animal. Messrs. Lawes and Gilbert of the Experiment Station at Rothamstead, England, who have made experiments in different departments of agriculture for more than forty years past, show by careful tests, that while pigs are usually fed much richer food than oxen and sheep, they still eat about twice as much as a sheep, in proportion to their respective live weights.

They also ascertained that 401 pounds of Indian corn meal and bran (dry) produced 100 lbs. of pork, live weight; while it required 1,548 lbs. of oil cake and clover hay, dry, to make 100 lbs. of mutton (live weight). It is well known that, in proportion to his size, the pig possesses larger and more powerful assimilating organs than other domestic animals; still the fact remains, that he gains much more from a given quantity of food than a well-bred sheep or steer. In regard to this point, Messrs. Lawes and Gilbert, the authority previously referred to, say: "In oxen, the stomach and contents constitute  $11\frac{1}{2}$  per cent. of the entire weight of the body; in the sheep  $7\frac{1}{2}$  per cent.; and in the pig  $1\frac{1}{4}$  per cent. The intestines and their contents, on the other hand, stand in an opposite relation; thus, of the entire body these amounted in the pig to about  $6\frac{1}{4}$  per cent.; in the sheep  $3\frac{1}{2}$  per cent.; and in oxen  $2\frac{3}{4}$  per cent. These facts are of considerable interest, when it is borne in mind, that in the food of the ruminant there is so large a proportion of indigestible woody fibre, and in that of a well-fed pig, a comparatively large proportion of starch, the primary transformations of

which are supposed to take place chiefly after leaving the stomach, and more or less throughout the intestinal canal."

Pigs, as well as all other animals, require a variety of food. No single article of diet can ever in itself meet all the requirements of an animal's system. Swine will probably eat a greater variety of food than any other animal, their diet consisting of various herbs, grasses, clover, roots, grains, fruits, nuts, flesh, fish, etc., when they can obtain it. Hogs will thrive well on good pasturage alone, and will relish red and white clover equal to a cow, while alfalfa is also excellent. Professor Shelton, of the Kansas Agricultural College, after experimenting with alfalfa for several years, states that he does not hesitate to say that one acre of alfalfa is worth as much for hogs as five acres of artichokes; that it furnishes two or three times the amount of food that clover or blue grass does.

Grain seems to be the cheapest food in the west for swine, and the main dependence of the farmers there. When fed in too large quantities, corn is too heating to the system; and too concentrated to be fed alone; consequently other foods are essential in the same connection for keeping the animal in good health and digestion. Artichokes, potatoes, rutabagas, parsnips, carrots, beets, and other roots are readily eaten by swine, as well as many insects, such as the larvae of the beetle and common grubs of pastures, frogs, and other small animals that they may be able to kill when running in large fields. When permitted to run in large pastures and timber lands, as is the custom at the South, for instance, they will readily devour acorns, nuts, and wild fruits. It is well for swine to run in the grain fields after harvesting, if possible, in order to glean what grain may have been left, besides obtaining a variety of herbage.

Corn, either ground or whole, fed with roots, grass, and a plenty of slops doubtless gives the best results in proportion to its expense, of anything in the grain-raising sections. In the autumn, pumpkins and grain boiled together are excellent for fattening swine. When *thoroughly boiled*, pigs will eat beans, and thrive well on them, although they are not as fond of them as of peas, which they will eat with avidity. Half peas and half corn are generally considered better than either alone. Peas make very firm pork. Oil cake, when fed in small quantities, in connection with other food, is very good for pigs; but when fed in too large quantities will injure the quality and flavor of the pork. It is excellent for breeding sows, as it is nutritious, keeps the bowels loose, and increases the quantity and quality of the milk. Bran is good to be fed in connection with oil meal.

When it is desired that the fattening process progress slowly, in order that the pigs may attain a large size before taking on much flesh, boiled potatoes and milk are very useful for the purpose. Small potatoes may be used to advantage for this purpose. The fattening process can always be greatly hastened by increasing the quantity of corn meal in the rations of the pigs.

Where fat flesh is desired for salting and barreling pork, the food of the pigs in rearing and fattening should contain a large proportion of Indian meal; but where hams and bacon are desired principally they should be fed more largely on grass, clover, sweet corn stalks, amber-cane and sorghum (when the latter have become well silked and headed), for green food, together with skim-milk, whey, bran, or middlings; while meal from oats, barley, or rye should be given instead of that from corn, since Indian meal makes fat flesh much more rapidly than that from other grains, while that from oats, barley, rye, etc., produces a fair proportion of lean meat.

Pigs should always be fed with regularity, and in quantity all that they will eat clean. Never allow them to leave food to be trodden upon and mixed with dirt, to be afterwards eaten, and never put food for them where it will be mixed with mud or dirt of any kind: always give it to them in a clean place. Partially decayed or frozen fruits, roots, or vegetables, should never be given swine, or other stock, as the effect is to disturb digestion, and render other food given less nutritious to the animal.

**Cooked Food for Pigs.**—The advantages of cooked or steamed food over that of uncooked for animals, have already been discussed in connection with the management of cattle, to which we would refer the reader; it will not, therefore, require further mention in connection with swine, except, perhaps, to give a few additional experiments. In the management of young pigs, whether weaned or not, it is well known to all breeders that cooked food is better than uncooked, since it is more easily digested, better assimilated and nourished, and is more like nature's food for the young pig. There are also many successful breeders of swine who advocate the cooking of food for pigs that are being rapidly fattened for market, and claim that the advantages to be gained thereby abundantly repay the labor and expense attending the process of cooking.

When we consider that the bulk of the grain that is fed to pigs is composed of starch, and that this substance consists of globules or grains contained in a kind of sack, and that to burst these grains, heat must be supplied equal to 162° to 212° F., we can readily see that the heat of the pigs' stomach is not sufficient to fully utilize starch foods; that in fact, these grains must be cooked in order that there may be perfect digestion and assimilation.

Raspail, a writer upon the chemistry of foods, says: "Starch is not actually nutritive to man till it has been boiled or cooked. The heat of the stomach is not sufficient to burst all the grains of the feculent mass, which is subjected to the rapid action of that organ; and recent experiments prove the advantage that results from boiling potatoes and grain which are given to granivorous animals for food, for a large proportion, when given whole, in the raw state, passes through the intestines perfectly unaffected, as when swallowed."

A Western breeder gives the result of his experiments as follows: "On the first of October, I divided six pigs, of the same litter, into two lots of three each, they being of the same weight and thrift—225 pounds each lot—placing them in separate pens. Lot No. 1 was fed upon corn-meal, soaked about 12 hours in cold water—all they would eat—with a little early-cut clover hay thrown into the pen for them to chew, to promote health. Lot No. 2 was fed corn-meal, thoroughly cooked, and fed lukewarm, *ad libitum*, with a lock of clover hay. This experiment continued till the 8th of January, or 100 days. Lot 1 consumed 2,111 pounds of meal, and gained 420 pounds—average 140 pounds each. Lot 2 consumed 2,040 pounds, and gained 600 pounds—average 200 pounds each. This gives 11 pounds gain, for one bushel of meal, by lot No. 1; and 16.47 pounds gain, for a bushel of meal, by lot 2. Lot 1 ate, on an average, 7.04 pounds of meal per day, and gained 1.40 pounds. Lot 2 ate, on an average, 6.80 pounds of meal per day, and gained 2 pounds.

"I have no doubt the gain would have been slightly larger in each lot if the meal had been mixed with the clover hay, cut. I have reached, with a larger lot of hogs, 17.20 pounds to each bushel of cooked meal consumed, mixed, before cooking, with a little cut clover hay. This is, however, a larger average than can be counted upon in any large operations."

Mr. Joseph Sullivant, the author of a valuable pamphlet on swine, made a careful examination of all available facts touching this subject, and gives the following as a summary of the result: "I conclude that nine pounds of pork from a bushel fed in the ear, twelve pounds from raw meal, thirteen and a half pounds from boiled corn, sixteen and a half pounds from cooked meal, is no more than a moderate average which the feeder may expect to realize from a bushel of corn, under ordinary circumstances of weather, with dry, warm, and clean feeding pens."

Whether it will pay to cook food for hogs will depend upon circumstances and surrounding conditions, and therefore each farmer must be a law unto himself in this matter, being guided by the facts and circumstances. The cost of labor, fuel, and apparatus being taken into account, it will generally be true that where a man has but few pigs, it will not pay to cook the food, but if he has a large number, it will most assuredly pay, and pay well. Putting it in a different way, it will cost nearly as much to cook food for ten pigs as for fifty or a hundred:

therefore cooking food on a small scale will usually be limited to those small farmers who have warm pens for their hogs and who fatten them in winter, when time and labor are not taken into account.

A well known agricultural writer puts it thus: "If ten pigs are fed 100 days upon 7 pounds of corn-meal each, per day — whole amount, 7,000 pounds, or 125 bushels — and if we suppose that cooking will give five pounds more to the bushel, or 625 pounds of live pork, and this is worth five cents per pound, the feeder will receive \$31.25 for the expense of cooking. It is for the farmer to determine whether he could afford to perform this labor for 31½ cents per day. But if he has 100 hogs to feed, he will receive \$312.50 for the 100 days, or \$3.12½ per day. It is easy to see that the latter will pay.

In our plan of cooking, we exclude all attempts to feed cooked food in troughs in the open air in cold weather. Nothing but failure can be expected of such attempts. The food will be hot or frozen. Great changes in the temperature of the food is not relished, and food in a semi-liquid state is to be avoided when the temperature is much below 60° F. If hogs are to be fed in the open air, in winter, it should be with dry food. Corn, then, will do best in its natural state; but if the weather is cold, as we have seen, it will require liberal feeding to produce any gain.

In rearing young pigs in winter, some arrangement for cooking will be quite essential to rapid growth. In preparing slops for the brood sows, to cause a generous flow of milk, cooking will be required. Facility for cooking will enable the feeder always to give a greater variety in the diet of young pigs, as well as fattening hogs. In cooking, everything may be used to advantage. Pumpkins, potatoes, carrots, beets, turnips, cabbages, short-cut clover, oil-meal, wheat-middlings — each or all may be cooked with the corn or corn-meal, making a savory mess, greatly relished by pigs or fattening hogs."

**Green Food for Hogs.** — In the summer feeding for pork, it is well to permit hogs to have access to green food. Pigs after being weaned may be given the freedom of a clover pasture, and thrive well, when allowed in the same connection also, all the milk and slops they will eat, together with cooked corn-meal. Mature hogs will do well on clover and corn, without slops, but should always be permitted free access to a plenty of pure water. Pigs are excellent scavengers, and will effectually root out and destroy the May beetle and other insect pests from portions in which they run. They will also eat such reptiles as snakes, frogs, etc., when they can have access to them. Hogs are very fond of blue grass, orchard grass, red and white clover, alfalfa, pig weed (*amaranth*), purslane (*portulacca*), and other succulent plants; also most of the common pasture grasses.

The field pea, cut just as the peas mature, is excellent for hogs. Sweet corn stalks cut as soon as they are silked; amber cane and sorghum cut after becoming well headed make also a valuable green food. Such stalks are sweet and tender, and the hogs will eat them up clean. Corn for soiling hogs should be planted in drills from two to three feet apart, and sufficiently thick to have the stalks from two to three inches apart. Hogs will always thrive best when permitted to have some green food, and can have access to the ground; in fact, they will not be long healthy without it.

**Salt.** — Hogs should have a little salt daily, or at least once a week, as it aids in promoting health, and gives a good tone to the stomach. They should also have access to ashes and charcoal occasionally. Animals that are to be used as human food, should be kept in as healthy a condition as possible, not only in respect to the kind and amount of food given, but in maintaining the best sanitary conditions by which they are surrounded.

**Pure Water for Hogs.** — Hogs should always be supplied with an abundance of pure water; this they require as well as any other animal, in order to be healthy. Some farmers seem to have the idea that hogs are exceedingly filthy animals, consequently that

anything is good enough for them, and that water from a muddy pool, covered with green scum and almost alive, sour slops, and decayed garbage of all kinds, are suitable materials from which to manufacture good healthy pork; but this is a great mistake. The hog would be a cleaner animal if he had the chance, and if pure water were given him in abundance and clean, nutritious food, there would be fewer diseases known among swine than there are at present. Grain-fed hogs, as well as others, will fatten much more readily when given a bountiful supply of good, wholesome water, since water enters largely into the system and also aids assimilation; therefore it is economy for the farmer to do this, even setting aside the comfort it will secure to the animal.

Dr. Stetson, a distinguished writer on swine husbandry, says on this point: "Corn soaked in cold water for from twenty-four to forty-eight hours is rendered very much more digestible in the stomach of the pig than when not so treated. Always keep in mind that the greatest quantity eaten and digested in a given time is the true secret of success in fattening animals.

"A few words as to the importance of fluids in the system to aid assimilation. All animals from man down, that, in a state of health, consume a large quantity of fluids, take on flesh in the same proportion. It is not the nourishment contained in the lager beer of our Teutonic friends that gives them their barrel-shaped abdomen. The same quantity of water, pure and uncombined, with the same amount of nutriment consumed, would produce the same result. Show me a fat man, woman, or child, or any other animal, and if not proven great drinkers, they are the exception, and not the rule."

Hogs should have all the water they will drink, even when fed with milk and sloppy food.

**Fat and Lean Pork.**—Hogs may be fed so as to produce a large proportion of either fat or lean meat, or a fair proportion of both fat and lean meat, as may be desired. As has already been stated, where a surplus of fat is desired in pork, the food of pigs, in rearing and fattening, should contain a large proportion of Indian meal; but where lean meat is desired principally for hams, shoulders, and bacon, a large proportion of their food should be grass, clover, and other green food, together with skim-milk, bran, or middlings, oat, rye, or barley meal, etc. It is found that when pigs, known to be good graziers, have the run of a clover pasture, which is rich in albuminoids and nitrogenous food, this being a principal source of subsistence, there is no lack of lean meat with the fat, and that the spare ribs, hams, and shoulders are all that could be desired in such cases. But some pigs are better graziers than others, the reason for it being that for many years they have been grown and fattened on food that was only adapted to lay on fat; so that, finally, there is hardly enough lean meat in the pig for the muscular action necessary in moving about. It is a fact well known, that the pig, in its native state, is nearly as lean as a beef animal.

Now if we start with the young pig, by giving it nitrogenous food, such as skim-milk, and a good clover pasture, oats, peas, wheat bran, or middlings, a little oil meal, decorticated cotton-seed meal, rye bran or barley, we shall see, as a result, rapid growth of both frame and muscle, the whole pig being of plump and comely appearance, but not over-fat. A recent writer has truly said: "It is the mode of feeding for so many hundred generations that has transformed our swine into lumps of fat, with a few strings of muscle to tie the ball together." Farmers sometimes forget that the pig is a grass-eating animal as much as the horse or cow, and needs fibrous food to keep his system in a healthy condition. When pigs are raised principally on grass, clover hay that is nicely cured will be greatly relished by them. If fat and lean meat in fair proportion, or what may be called "marbled pork" is desired, a nitrogenous food, as above recommended, should be given; yet in such cases corn should be given at the last stage of the fattening to harden the pork. Corn in small quantities may be fed

all through the life of the pig in connection with nitrogenous food, and the result be a fair proportion of lean meat.

**General Management of Swine.**—So much has already been stated with respect to the management of swine in a special manner, it would seem that but little remains to be said in a general way on this subject; there are, however, a few points that we would like to impress more fully upon the minds of farmers with respect to sanitary conditions, etc., in the care of swine. The method of managing pigs varies with different localities and circumstances. The dairy farmer utilizes his skimmed milk and whey in the rearing and fattening of swine. In the great grain-growing region, where corn is cheap, pigs are employed as machines for converting this grain into marketable pork in the shortest space of time. In many parts of the South hogs are permitted to run in the extensive timber lands to utilize the natural roots, waste and wild fruit, in connection with the cultivated products of the plantations; there are, however, certain sanitary conditions to be observed in all systems of management, in order to render the rearing of swine attended with profit.

In order to be healthy, hogs should have, in addition to a sufficient amount of suitable food and pure water, pure air, plenty of room—never overcrowding,—and cleanly surroundings. During mild weather, whether growing, fattening, or kept as show stock, or breeding purposes, swine should be permitted to run in a pasture where the soil is dry, and there is a plenty of pure water. There should always be a plenty of shelter provided in sheds, to protect them from cold winds, rains, sleet, and snow. These sheds should be in a dry yard and arranged on the east, north, and west side, so as to be able to open to the south. They should be well bedded with clean straw, and kept especially free from manure. Where swine are permitted to run in too large numbers together in cool weather, they will be apt to crowd together in some warm corner of the shed to lie at night, and pile one upon another in such a manner as to smother and kill those that may lie underneath.

In hot weather in summer, pigs need a cool, airy place to lie and be protected from the hot sun, as well as a good warm bed in winter. Never permit them to lie in a heap of stable manure; it is one of the worst places that a hog can have for a bed. No animal can inhale the noxious gases that arise from such a source any length of time and be free from disease. Hogs kept in barn cellars to work over the stable manure cannot therefore be fit for human food. The bed of swine should always be dry. If obliged to sleep in a damp bed, disease of some kind will be liable to be the result. A swine breeder of large experience says on this point:

“There are certain features in the pig business that are not usually well enough considered. Among these are the *time* spent by the pig in his nest, especially in winter, and the damaging effects of overlying. The hog buries himself, head and all, in his straw, breathes upon it, and this, with the dampness which otherwise naturally accumulates from his body so many hours of each day in the nest, renders it damp and entirely unfit for continued use. If the owner were to sleep upon a damp bed for one night, pneumonia or rheumatism would be quite likely to follow. The pig is subject to the same influences as his owner, and suffers from similar ailments.

Overlying is worse than a merely wet nest, because the hog suffers from overheating, as well as from too much moisture. Hogs come out of a nest in which they have been crowded, steaming and coughing. A winter spent in this manner is quite sufficient to fasten a diseased state upon a herd of swine so treated, for they are as liable to lung disease and rheumatism as man. Hogs contract disease through winter exposures in the way named; wheeze and cough until warm weather, and then measurably recover. Yet, during this period they show no thrift, make no growth, and hence are a source of loss continually.

At the approach of the next fall season they are found to take cold easily, and they require careful management to get them through to killing time. Upon being dressed, an

ulcerated liver and hepatised lung tissue are often found. In fact, any ailment which comes from disordered circulation may overtake the pig that is inadequately sheltered, or is crowded in the nest, even though in the best of shelter. Under favorable conditions the pig will go to a distance from his resting place to deposit his droppings, but if overcrowded or chilled, he will leave his nest with reluctance and relieve himself close at hand, again crowding in among his fellows in the hope of securing that sensation of warmth so grateful to him.

Keeping pigs in this way secures no gain worth the name, while by giving cheap, needed comfort for the farm or village pig, he can be made to pay a better profit than any other beast upon the farm, when all the advantages are considered, the small investment in each pig, provided he is bred and reared by the farmer under economical conditions, and the early age at which he is sufficiently matured for market, for he will, if properly bred and fed, be ripe at any age. The well-fed lamb approaches him in the requisite of being fit for market at an early age, but when we set the product of the ewe (a unit) opposite the brood sow with her seven to ten pigs, it takes no complicated estimate to show the brood sow is the most profitable in enabling us to secure the largest possible returns early from an unpretentious outlay."

It is a good plan to provide a scratching post for pigs to scratch themselves against in the pen. Such rubbing is very grateful to them. The post should have wooden pegs inserted at different heights to accommodate pigs of different sizes.

When swine are treated in a proper manner there will be fewer diseases known among them, and the business of rearing them will be attended with greater profit than the average swine breeder at present realizes.

**Is the Pig a Filthy Animal?**—The opinion is too often entertained by those having the care of swine, that the pig is an exceedingly uncleanly animal, and delights and thrives in the most filthy surroundings; we believe, however, that this is a charge that is not well founded, and that those having the care of swine are more responsible for such an opinion than the pig himself. It has been the experience of those breeders of swine who have taken the same pains to keep their pigs in as cleanly and comfortable quarters as they do their horses and cows, that swine are fully as cleanly in their habits, and even more so, than a horse, cow, or sheep, either of which after rendering their bedding filthy will lie on it, which is what a pig will not do if he can avoid it. It is a fact, that no hog will ever carry damp or filthy straw to his nest, if he can have access to that which is dry and clean.

If there is a plenty of room in his pen, so that the feeding place is removed from the sleeping place, he will be particular to deposit his excrement away from either locality, which is also what the horse, cow, or sheep will never do. He will not render these portions uncleanly, unless he is forced to do so by overcrowding, which we do when we confine him in a small pen with half a dozen others, and compel them all to sleep in one small portion, perhaps a ten-by-five space, and use the other portion of equal size as a place for the droppings and for feeding, and this perhaps without being cleaned out oftener than once a month, if as often as that. The farmer who manages his cow and horse stables well, cleans them out at least once a day, and sometimes twice, but the pig pen is too often neglected until the pigs are in danger of being submerged. We have, in fact, seen pig pens so filthy that there was not a dry spot upon which the poor animals could make their bed, while in their small yard, they actually swam in the accumulations drained from the barn yard and their own filth; and this too on the premises of those who considered themselves, and were also rated by others in the vicinity, as first-class farmers!

No animal used as human food should be bred in filth. When pigs are treated with the same consideration and care that are bestowed upon the horse and cow, we shall find that he is in fact a cleanly animal, and will never soil either his eating or sleeping place with his own refuse. To those who are skeptical on this point, we would say, give your pigs a roomy,

clean pen, allowing them a fair trial, and they will prove to you the correctness of the above statement.

**Bath for Hogs.**—Pigs like a place to cool themselves in hot weather, and if they can find no better place, they will wallow in the mire for this purpose, but if given access to clean water, in which they can lie, they will readily avail themselves of the opportunity, and keep clean. The fat pig, like the fat man, is necessarily a sufferer from the hot weather of summer, and when provided with a suitable bath in which to cool himself and cleanse his skin, will be greatly benefited by it.

A Western breeder gives his experience in preparing a bath for swine, thus: "Some years ago we tried an experiment, by making a shallow bath, 4 feet wide, and 10 feet long, of plank, with sides 8 inches high. This, being bedded in puddled clay, was easily made water-tight. The whole thing did not cost more than three hours' labor. Water was pumped from a stock-well near by, and run into this bath by a spout. Gravel was placed some inches deep around the bath to prevent mud. The water could be drawn off through a small box-drain under it. This was drawn off and filled every second day. The pigs did not require any teaching to avail themselves of this aristocratic bath. We have seen seven pigs enjoying this bath at once, while others outside, envious of their enjoyment, were attempting to root them out that they might take possession.

The effect of this bath appeared in every way most salutary, and not a pig in the lot (some 20) but availed himself of it. They kept their skins clean, and the remark was often made, 'that this lot of pigs belonged to a higher class than the mud-wallowers.' We found this plan of summer bath so simple and so cheap that it might be adopted for a large lot of pigs at small expense and labor. Many farmers have water that they can easily conduct into such a bath, and have it full most of the time with little or no expense except the construction of the bath. Our bath was 8 inches deep, but we only let in 4 inches of water, as the pigs would fill the other half of the space with their bodies, and this would fill the vat with water.

During the warmest weather, charcoal, mixed with a small proportion of sulphur, should be kept in a trough, where they can eat it when they choose. We have been in the habit of putting a small amount of sulphate of iron (copperas), in the bath water. It is an excellent deodorizer and purifier. If they drink the water it will not hurt them."

Another writer says, in one of our leading journals: "Some years ago we tested the pig's disposition to keep clean where the opportunity was given, by placing in his pasture a shallow bath of clean water. This privilege was eagerly used, in preference to wallowing in a mud hole a few rods off. This shallow bath was filled with fresh water three times per week, and it was noticed that the pigs seemed always to enjoy the renewal of the water. This certainly indicated a nice discrimination in cleanly habits."

**Convenient Piggeries.**—This subject will be found treated under the heading of Hog House, in the department of FARM BUILDINGS (Vol. I, page 463).

**Kind Treatment of Pigs.**—The pig is generally regarded as an obstinate animal, and is commonly treated accordingly. Even on farms where other domestic animals are cared for with the utmost kindness and consideration, pigs are generally the exceptions to the general rule in this respect. We believe that all domestic animals are much more valuable, and the labor of caring for them greatly lessened when kindly treated, since they thus not only thrive better, but are much more easily controlled. All animals on the farm should be managed with firmness, yet gentleness, and by the treatment they receive, should be led to regard the one having charge of them as their protector and friend, rather than an enemy from which to expect blows and harsh tones.

We fully agree with Harris on this point, who says: "If well-bred and properly treated, the pigs will go to their own pens as readily as cows or horses will go to their own stalls."

This may be doubted by those who ill-treat their pigs—or, in other words, by those who treat their pigs in the common way. But it is, nevertheless, a fact, that there is no more docile or tractable animal on a farm than a well bred pig. There is a good deal of human nature about him. He can be led where he cannot be driven.

A cross-grained man will soon spoil a lot of well-bred pigs. They know the tones of his voice, and it is amusing to see what tricks they will play him. We have seen such a man trying to get the pigs into their respective pens, and it would seem as though he had brought with him a legion of imps, and that seven of them had entered into each pig. No sow would go with her own pigs, and no pigs would go with their own mother; the store pigs would go into the fattening pen, and the fattening pigs would go where the stores were wanted. Should he get mad, and use a stick, some active porker would lead him in many a chase around the barn-yard; and when one was tired, another pig, with brotherly affection, would take up the quarrel, and the old sows would stand by enjoying the fun. Let no such man have charge of any domestic animals. He is a born hewer of wood and drawer of water, and should be sent to dig canals, or do night-work for the poudrette manufacturers."

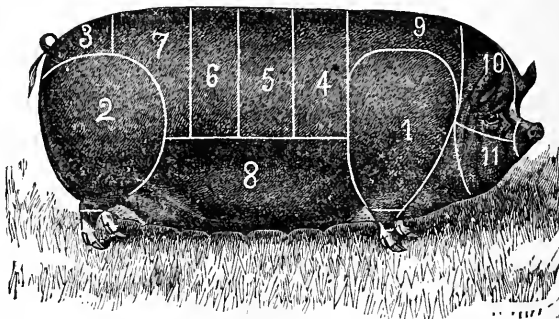


DIAGRAM FOR CUTTING PORK.

**Cutting Pork.**—The cutting of pork should be done with reference to the use for which it is intended. In the great pork packing establishments, the manner in which it is cut and cured has special reference to the particular markets to which it is to be sent. Sometimes in hams the hip bone is removed at the socket, and sometimes left entire, while the shank is left long to the hock joint, or cut close up to the ham. The shoulder may be cut square back of the shoulder blade and neck, or trimmed off rounding at the upper portion. The bacon pieces may comprise the entire side from the ham to the shoulder, or the flank piece may be separated from the back piece. The whole of the ribs are generally taken out, but sometimes the tips are left in. Mess pork is the side pork containing the bone; clear pork is the side meat containing no bone.

The carcass of a pig is first divided down the back bone into halves. The shoulder, numbered 1 in the diagram, is cut as shown by the lines; number 2 is the ham cut in a circular direction, the bone being sawed through a short distance from the hip joint or whirl-bone. If this piece of bone is removed from the ham, there will be a vacancy produced in which flies will be apt to enter and cause trouble; it is therefore better to let it remain. The rump piece, 3, to which the tail is attached, also 9 and the loin piece 7, may be salted or used fresh; 4, 5, and 6, make good roasting pieces, or may be cut up for chops and cutlets; or the ribs may be taken out, and the whole side, including 8, may be cured for bacon, or be salted. The lower portion, 8, however, makes the best bacon, being made up of thin, alter-

nate layers of fat and lean; 4, 5, and 6, are what the packers call "mess" pork; but when exclusively fat or without lean meat, is called "clear mess" pork.

When used for bacon, this portion of the carcass is cut in long strips, such being very convenient for smoking; when only salted, to be used as salt pork, it is cut in pieces most convenient for packing. The head should be split down the face, and the jowls, or chops, 11, separated. These are generally salted and smoked. The remainder of the head, with the ears and feet, together with the trimmings of the hams, may be boiled and made into head cheese; or the feet, legs, ears, and snout, may be used as pickled souse.

**Packing Pork.**—Clear, fat pork will never become oversalt, no matter how much salt may be used in packing; a certain amount only being taken by the meat, while the surplus, if there be any, will remain undissolved in the brine. A new, clean oak barrel is best for packing pork. Cover the bottom of the barrel with an inch of dry, coarse salt; then pack the pork in even layers, the skin coming in contact with the sides of the barrel in circles; cover each layer with the same quantity of salt, filling all the spaces. The pieces of pork should be packed as closely and compact as possible. When the barrel is filled, cover the top layer with an inch of salt, and make a strong brine and fill the entire barrel so that the meat will be entirely covered with it. Some simply turn water into the barrel and leave the brine to make itself by dissolving the salt, but we think the first method is to be preferred, as the salt then takes effect at once upon the meat. Never pack pork until it is *entirely cold*, or until all the animal heat has left it, which will require more time than one would suppose. Brine should also never be put to the meat until it is as cold as may be.

Pork cured in the above manner will keep sweet in any climate or weather; but it must always be kept covered with brine. Small, floating pieces must always be removed from the barrel. Never pack any joints or bloody scraps with the clear pork; hams, shoulders, back-bones, etc., must be packed by themselves. Never pack pork in a barrel or cask that has been used for any other purpose. From forty to fifty pounds of salt are generally used for a barrel of pork, but if double this quantity be used, no harm will result for reasons previously given. The best quality of salt should always be used. Sometimes a small quantity of saltpetre is put into each barrel. This hardens the pork, and gives it a reddish color. Pork should always be kept well covered with brine, and the barrel should be looked into occasionally to see that it does not leak. Carelessness in this respect has sometimes caused the loss of large quantities of meat.

**Curing Hams and Bacon.**—Before putting into the pickle, the hams and shoulders should be trimmed in such a manner that there will be no loose masses of fat lying at the lower end; all such pieces should be cut off and tried up with the lard. The hams, shoulders, and other parts of the animal, counting bones as well as the pieces designed for bacon, should be salted by themselves, and never with the clear mess pork. These should be cured just enough to season them for cooking without freshening, as the smoking is in part a preservative process; besides, if made so salt as to require freshening before cooking, the fine flavor of the meat is lost, and its quality greatly injured. If any portions of the meat to be put into the pickle are bloody, the blood should first be washed out; otherwise it will soak out in the pickle, rise to the top in a bloody scum, and finally taint all the meat. A syrup or molasses barrel, made from cypress wood, makes an excellent barrel, and is easily obtained, for pickling hams and bacon. There are various recipes in use for curing hams and bacon, by both the method of dry salting and pickling, some of which are as follows:

For 100 lbs. of bacon or hams: Take 4 gals. water, 6 lbs. of salt,  $2\frac{1}{2}$  oz. saltpetre,  $1\frac{1}{2}$  lbs. A or granulated sugar; boil and skim carefully, and turn on when cold. The same receipt is equally useful for beef, during all except the hot months.

Another method: Make a pickle in the proportion of a pound and a half of salt, and half a pound of sugar to a gallon of water. Boil and skim; and when sufficiently cool, pour

it over the meat in sufficient quantity to cover it well. In six weeks or two months they will be sufficiently cured to take out, dry and smoke. Small hams and shoulders will of course cure much sooner than large ones. Saltpetre causes meat to retain its red color.

The following is also highly recommended by those who like spice-flavored meats:

For 100 lbs. of meat take 7 lbs. of good salt, 3 lbs. of brown sugar (or one quart of molasses), 2 oz. of saltpetre, and  $2\frac{1}{2}$  oz. of cloves; 2 oz. of black pepper may also be used, if it is not distasteful to those who are to eat the hams. Pepper is used merely to prevent attacks of flies. Boil all the ingredients in sufficient water to cover the meat when closely packed in the cask. Skin and cool before pouring over the meat. The same ingredients can be used for rubbing the hams, if this mode is preferred to a pickle. For rubbing, however, it is better to add another pound of salt and half a pound of sugar to the above ingredients. This pickle is equally good for hams, shoulders, bacon, corned beef, and dried beef. When corning beef, the meat should be well rubbed in salt, and packed closely in a cask two days before it is pickled. This extracts the blood, and the meat must be taken out and washed before packing for pickling.

Another pickle for fifty lbs. of meat is sometimes made of 3 lbs. of common salt, 2 lbs. of bag salt, 6 ounces of sal prunella, and 4 lbs. of brown sugar.

Still another for the above quantity of meat is prepared from  $4\frac{1}{2}$  lbs. of common salt, 3 oz. saltpetre, 3 ounces sal prunella, and 4 lbs. brown sugar.

The following is a favorite English method for curing bacon and hams: Half a pound of saltpetre is pounded very fine, and then divided equally,—half for the two hams, and half for the sides. For bacon, the powdered saltpetre is then rubbed into the meat on the flesh sides, and the meat is afterwards laid on a bench or table in a cool room, with the skin side down, where it remains twelve hours. Seven pounds of salt and one and a half of brown sugar are then well mixed and heated in a frying pan, and thoroughly rubbed while hot all over the meat. The meat is then put into a salting tray or cask, and the brine begins to form. The meat is well rubbed and basted with the brine every other day, and turned, the bottom pieces being put on the top. After four weeks of this treatment, the meat is hung up to dry, and then smoked. The hams are treated in the same manner, except that 4 lbs. of salt and  $1\frac{1}{2}$  lbs. of brown sugar are used. These remain in the pickle five weeks, and are turned every day. The meat is not smoked until quite dry on the outside, or until the salt crystalizes upon the surface.

For dry salting, a table, bench, or platform of boards will be necessary, where the drip will do no harm, or so constructed that it may be conducted into a pail. Mix a pound and a half of brown sugar with every four pounds of salt; rub the hams with it thoroughly all over every day for a week, laying them down on the skin side; afterwards every two or three days for two more weeks; then brush off the salt and smoke.

**Smoking Hams and Bacon.**—After being properly cured, hams and bacon should always be thoroughly dry before being smoked. The meat should be hung up in a dry place for three or four days after curing, in order to drip and have the surface become thoroughly dried. In smoking, be careful not to heat the meat. Some prefer to smoke the meat once in two or three days, taking considerable time for it; others consider five or six consecutive days sufficient. Where there is considerable meat to smoke, a smoke-house will be a necessity.

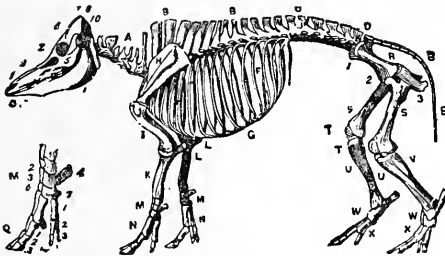
Corn cobs are excellent for smoking hams or bacon, as they impart a sweet and pleasant flavor. Green hickory or sugar maple chips are also good for this purpose. Some prefer the sawdust of these woods, or small brush, to chips. Burr oak wood is also used for smoking. The French use damp wheat straw for this purpose. The smoke should be applied to the meat cold. The temperature of the smoke-house should never be above  $80^{\circ}$ , and hams should never be allowed to freeze, either before or after smoking. After being well smoked and dried, the hams should be put in bags made of common unbleached cotton cloth, well sewed,

and covered with a coating of whitewash or other preparation, to protect from flies. A farmer who is famed in his section for the quality of his hams and bacon, gives his method of smoking as follows:

"After the meat is sufficiently salted, it should look bright and clean, should be hung up for three days in a warm, dry place, to drip and dry thoroughly, and then smoked. Five days' consecutive smoke is enough. Some careful men take a long time, smoking once every few days, keeping in the smoke-house meantime. I have no smoke-house, and my rule is to smoke for five days, burning corn cobs, then hang in a dark, dry place, of even temperature, using as desired until about the first of May; then I smoke the pieces again for a day or two, wrap in newspapers, and hang in cotton bags made for the purpose, into which the meat is slipped, the end tied up, and the whole hung in a dry cellar."

Mr. H. Stewart says: "To preserve bacon or hams, they may be packed in a common pine packing case or dry goods box, first laying in a bed of the sweetest hay; that with some sweet vernal grass in it is the best; each piece of meat is then wrapped separately in the hay and packed closely, with hay between the pieces; a thick layer is placed on the top, and the box is closed and kept in a dry, dark closet. This is better than papering and canvassing.

The smoking should be done a little each day, and no heat produced—only enough to dry the meat thoroughly. If the meat is dry it will never mould while kept in a dry warm place, and it will improve in flavor for almost any length of time."



SKELETON OF THE HOG.

NAMES OF THE BONES.—*A*—Cervical vertebrae. *B, B*—Dorsal vertebrae. *C*—Lumbar vertebrae. *D*—Sacrum. *E, E*—Coccygeal bones. *F, F*—Ribs. *G*—Costal cartilages. *H*—Scapula. *I*—Humerus. *K, K*—Radius. *L*—Ulna. *M*—Carpus, or knee. 1. Scaphoid. 2. Semi-lunar. 3. Cuneiform. 4. Trapezium. 5. Trapezoid. 6. Os magnum. 7. Unciform. 8. Pisiform. *N, N*—Large metacarpal, or cannon. *O*—Small metacarpal. *P, P*—Sesamoid bones. *Q, Q*—Phalanges. 1. Os suffraginis, or pastern bone. 2. Os coronæ. 3. Os pedis. *R*—Pelvis. (Fore-leg of pig. Phalanges 1, 2, 3). 1. Ilium. 2. Pubis. 3. Ischium. *S*—Femur. *T*—Patella. *U*—Tibia. *V*—Fibula. *W*—Hock. 1. Os calcis. 2. Astragalus. 3. Cuneiform magnum. 4. Cuneiform medium. 5. Cuneiform parvum. 6. Cuboid. 3, 6. Cubo cuneiform. *X*—Large metatarsal. (Hind-leg of pig. Phalanges 1, 2, 3). *Y*—Small metatarsal. *Z*—Head. 1. Inferior maxilla. 2. Superior maxilla. 3. Anterior maxilla. 4. Nasal bone. 5. Molar. 6. Frontal. 7. Parietal. 8. Occipital. 9. Lachrymal. 10. Squamous-tempoid. 11. Petrous-tempoid.

Some bury the ham in a bin of shelled corn, to protect it from flies, after covering it with canvas. When well cured, dried, and smoked, it will not get mouldy by being packed in this manner.

**Skeleton of the Hog.**—The illustration of the skeleton of the hog will serve to give a correct idea of the anatomy of this animal. The first series of figures following the capitals refer to the bones of the fetlock and feet. The figures that follow Phalanges 1, 2, 3, refer to the bones in the hind part of the body. The last series of figures following *Z*—Head, indicate the bones of the head.

## DISEASES OF SWINE.

**S**WINE are subject to comparatively but few diseases, and these are most of them of a malignant, epidemic, or contagious form of a serious nature. Many of the ailments of swine are brought on by a lack of sanitary conditions, such as filthy, ill-ventilated pens, overcrowding, improper food, exposure to storms, and cold weather, the use of unhealthy and badly-mated breeding stock, etc. To prevent diseases in swine, as with other domestic animals, is much more easily accomplished than curing, as by good care and management many diseases may be prevented that cannot be cured. Other hogs should never be admitted among the herd, until, by keeping them apart for some time, it is ascertained that they are entirely free from any contagious disease.

As soon as an animal is found to be ailing, it should be at once isolated from the others, unless it be a case of some very malignant disease like the hog cholera, when we would advise that the animal be killed at once and deeply buried, while every place where contagion may possibly lurk should be thoroughly disinfected. This, if accomplished in season, may save the breeder great loss, in checking the spread of the disease. Medicines can best be given hogs mixed with their food; but if the patient is so feeble that he will not eat, or drink, it will be necessary to pour it down his throat, if given at all. In warm weather, when a pig is so sick that he refuses to eat, it may sometimes be well to turn the animal into a field where there is plenty of water and shade, and permit him to shift for himself for a few days. In such cases the animal will sometimes burrow a deep hole in the ground, into which he will get and lie from twelve to twenty-four hours, when he will come out apparently all right.

In cold weather a sick pig should have a warm, clean bed in his pen, with plenty of pure air and fresh water, and all the gruel slightly salted that he will eat. When a pig is taken sick, it will be well to investigate and see if it is not the result of wrong management. The pens should be cleaned out, and all the decaying filthy material scraped from the floor, under and around the feeding trough. Scald the troughs in boiling water, letting them remain in the hot water until they are perfectly cleaned; then sprinkle carbolic acid about the pen, or chloride of lime to disinfect it, the former being the best. Dry earth is also an excellent disinfectant, as well as absorbent of both liquid and solid manure, for use in pens where pigs are kept. The walls of the pen should also be whitewashed, while crude petroleum may be used for washing the wood-work, such as troughs, floors, etc.

Cleanliness is the great preventative of disease, and under proper sanitary management there will be few diseases, except those taken on exposure to contagion, and even in the latter case, there will be less liability of contracting such contagion when animals are well cared for, with all the essential conditions of health observed. Give the hogs clean, well-ventilated pens, a large yard or lot in which to exercise, a sufficient supply of sweet and pure water, and access to fresh earth at all times, always avoiding over crowding, and they will seldom, if ever, be troubled with disease of any kind. Whenever veterinary aid seems necessary, a competent veterinarian should be employed; but ignorant quacks should be avoided: they kill more animals by their nostrums than they cure.

**Apoplexy.**—Sometimes called "staggers" or "congestion of the brain," is not unusual in very fat hogs. It is generally attended with a constipated condition of the bowels, a hard, rapid pulse, and a red, inflamed condition of the eyes. The animal will appear stupid, and as the disease progresses will sometimes become wholly or partially blind, going in a circle or striking against objects, falling at last unconscious, when the limbs stiffen, froth issues from the mouth and the breathing is deep and hard. Sometimes the attack is sudden, and the animal falls without other symptoms being previously noticeable. Cold water is an excellent application for the head at such times, it being permitted to fall on the head from a

considerable height; in the same connection give as quickly as possible an injection of warm water; this to be followed with a mild dose of Rochelle salts and sulphur. Ipecac given in water, to induce vomiting, is sometimes resorted to in place of the purgative. Bleeding will often be attended with good results. Light feeding for a few days will be essential if the patient improves. With all animals attacked with this disease recovery is doubtful.

**Colic.**—The symptoms of colic in the pig are similar to those described in the other domestic animals, it being attended with great distress. Pigs are the most difficult of all animals to administer medicine to, owing to the trouble of handling them. Give in warm milk a full dose of castor oil, together with two teaspoonfuls of powdered, or one of the extract of ginger. An injection of warm water, when it can be given, will also be beneficial.

**Constipation.**—Although this may not properly be called a disease, yet if neglected will be liable to lead to many serious ailments, and should therefore be corrected as early as possible. Frequently, a change of diet will be all that will be essential to effect a cure. Cotton seed meal, or oil cake given in moderate quantities with warm bran makes an excellent food for relieving a constipated condition of the system; also flax seed tar, or slippery elm water. If these prove ineffectual, an injection of warm water, in which an ounce of Epsom salts has been dissolved, or with a little castor oil or linseed in it, should be given. In summer, plenty of green clover and roots will usually remedy the evil.

**Diarrhea.**—This disease is liable to carry off many little pigs in the herd, and injure those that survive the attack, which is generally during the first ten days after birth. The difficulty is usually occasioned by feeding the sow improper food, which affects injuriously the character of the milk. Sometimes improper food eaten by the pigs at the time of weaning, or before, will bring it on. It is also frequently occasioned by breathing impure air, drinking dirty water, or by taking cold. Pigs should never be exposed to storms, or be obliged to lie in a cold, wet bed. Pens located on damp, undrained land, will be the cause of many ailments to the swine.

Give good, nutritious food, and put a mixture of powdered charcoal and salt where the sow and pigs may eat all they will of it. If pigs are attacked before being weaned, give the sow dry food for a few days. Two teaspoonfuls of prepared chalk per day is a good remedy; also fresh scalded milk in which wheat flour is well cooked, it being made into a gruel, will be excellent for the little pigs. Warm ginger tea, in which is a small dose of castor oil, both to be mixed in scalded milk, is also beneficial. Care should be exercised in this disease not to bring on a constipated condition of the bowels, by giving food or medicine that has too much of an astringent tendency. By looking well to the cause of the difficulty and the sanitary condition of the swine, the disease may be avoided altogether.

**Fractures.**—Fractures occasionally occur in swine, but from the obstinate nature of the animal, but little can be done in the way of treatment. When the fracture is of a simple nature, put the animal by himself, giving him plenty of good food and drink, and let nature effect the cure; but if it be of a serious nature, the animal had better be slaughtered at once for food, and put out of its misery, as this would not only be the most humane, but the most economic way of disposing of him.

**Hog Cholera.**—This disease is known by various names, such as swine plague, hog cholera, hog fever, styne fever, etc. This is a terribly fatal disease among swine, more losses having been sustained from it than any other disease known to swine breeders. In some herds it will appear in a mild form, and it may be weeks and even months before the disease is recognized; in others, large herds will be almost entirely swept off in a few days. It is very contagious and virulent, and if not generated directly by unsanitary conditions, such as crowding together large numbers, foul pens and yards, eating improper food, drinking impure water, breathing poisoned air, etc., such conditions cause it to develop very quickly when the

germs are once introduced from other sources. Dr. Stetson, who has given much time and attention to the investigation and treatment of this disease says: "Neglect of sanitary laws is the chief factor in generating this fever, and no instance can be found where it has originated *de novo*, unless there has been a palpable violation of these laws.

The massing together of large numbers of hogs always has been, and ever will be, the most fruitful cause. In more than one instance have I known this disease to originate from hogs being confined to the drinking of water from shallow ponds, surface water, and also to their being confined to the drainage of manure heaps. It is just as necessary for the hog to breathe an untainted atmosphere and have pure water to drink as it is for the human family. This disease only originates from neglected sanitary regulations, and like its congener in the human family, the typhus fever will become, with proper hygiene, a thing of the past. A hog wants something besides food; he must have pure air and a well-ventilated apartment, with pure water, and not the stagnant water of his own cesspool. There is death in bad air, and impure water is not safe for even a hog to drink."

It is supposed that the germs of this disease may be carried to a considerable distance in the air, without any direct means of communication.

**Symptoms.**—The symptoms of this disease vary somewhat according to its type, the season, and temperature. There will generally be great weakness and prostration, accompanied with considerable fever, the temperature of the body often being as high as 105° F., as indicated by a clinical thermometer inserted into the rectum. The animal shivers; the nose is hot and dry; pulse weak and rapid; eyes sunken and dull; there is great thirst; quick breathing, a hard dry cough; the skin hot and sore, sometimes having red and dark spots. The bowels are also very sore, and the animal will frequently show great distress, if handled or made to move about. In the early stages, the animals have sometimes a constipated condition of the bowels, but as the disease progresses, a fetid diarrhœa sets in, and bloody matter is often passed, showing an ulcerated condition of the bowels. The last stages are denoted by stupor, paralysis of the hind limbs, involuntary motions of the bowels, etc.

**Treatment.**—Various remedies have been tried for this disease, some of which in certain cases have been found quite beneficial, while in others no medical treatment whatever seems to be of any avail. We would advise to kill and bury deeply or burn the carcasses of all animals affected, unless they can be treated in a place at a distance from all others, where the atmosphere is constantly disinfected by the use of carbolic acid. In such cases give two ounces of castor oil, and when it has operated, give two or three times a day twenty grains nitrate soda, and eighteen grains nitrate potash, mixed in a little milk or gruel, and let the animal have powdered charcoal in the water it drinks, which should be pure.

A Western breeder recommends the following remedy: "Twelve grains of quinine to each hog weighing 250 pounds, or at the rate of five grains for each 100 pounds will, I think, prevent any hog or pig dying that is well enough to eat.

For 40 pigs weighing 250 pounds each, I take one bushel of common wheat bran, put it in a tub, and pour boiling water over it, and cover it with a blanket or cloth after thoroughly mixing it about as wet as it will stand, not to run. When it has cooked about to blood heat, I mix the quinine in, and having put the pigs into clean pens, feed the bran and quinine, and have never known it to fail to at once arrest the disease, and cure all the pigs you could get to eat. It is simple and cheap, and worth a trial. I have at different times induced my neighbors to try it with like good results."

Another remedy, highly recommended by some breeders of swine, is five grains of calomel, one drachm nitrate of potash, and ten grains powdered camphor, given in a little gruel three times a day, omitting the calomel after the third day. Keep the sick animals entirely by themselves.

Preventive measures are far better than curatives in this disease, for if a treatment could be devised that would save the life of a hog having it, such an animal would prove of but little value afterward, unless the attack were an exceptionally mild one, for the animal would require so long a time to entirely recover from its effects, that it would in the end, as a rule, be a loss to the owner.

**Preventive Measures.**—The best preventive measures to be adopted for this swine scourge is to maintain the best possible hygienic conditions; as previously stated in the same connection, carbolic acid given two or three times a day in the water for drinking has proved very beneficial in many instances. A gentleman in France who is an extensive breeder of swine states that this disease, known in that country as *rouget*, is often the occasion of great loss there, but that he has escaped losses from this cause by disinfecting his piggeries, and by giving in each full-grown pig's food a teaspoonful of a mixture consisting of two and one-half ounces of pure carbolic acid, and one gallon of common vinegar; and also, by giving them occasionally a moderate dose of nitre or sulphate of soda.

Dr. Stetson says in this connection: "As nothing ever did or will exist without an adequate cause, there must be a cause for hog cholera. Now, if the cause can be effectually destroyed, all danger will be avoided, and the swine grower can have reasonable security that his herds will be protected. I am not prepared to say that such an infallible antidote has been discovered, but this I can say in all good conscience, that during a period of fifteen years or more I have been in the constant habit of giving my hogs carbolic acid to prevent this disease among my own hogs, and that thus far I have escaped beyond my most sanguine expectations. I do not say that this disease has not broken out, but if so it has been in so mild a form, and the losses have been so trivial, that no one but a person on the constant lookout would ever have suspected disease.

I have used the various preparations of carbolic acid, and for the past few years only the crude acid, which contains not only carbolic acid, but all the other uncrystallized acids of coal tar. This crude carbolic acid is of about the color and consistence of pine tar. From long use I am satisfied that it has the same or equal prophylactic virtues as the crystallized acid, and at a much less cost. I purchase by the gallon, and give it to my hogs in the water they drink. I suppose it is possible to give it in poisonous quantities, but my experience teaches me that there is little or no danger to be apprehended on that score. For more than a score of years my hogs have got their water from what is known as a hog waterer. This is made by connecting two barrels with gas pipe, and fed from a reservoir higher than the barrels. To prevent the water overflowing in the barrel connected with the reservoir, it is supplied with a valve and float, which will control the water to a desired height. Into the barrel with the float I introduce a pint or more of the crude acid as often as once a month, if 100 or more hogs drink from the barrel. The water, in its passage from the fountain through the barrel with the float to the barrel from which they drink, keeps their drinking water constantly impregnated with the acid, and the peculiar scent of the acid is an evidence that it is not exhausted. I endeavor to have this scent constantly in the drinking water, and fresh additions are necessary to keep it up.

In the absence of such a watering arrangement, the acid may be given in their water or swill trough. If a small quantity is given each day no harm will be done, but as often as once in each week is imperatively demanded. The quantity of the acid for a single hog never entered into my calculations. I should think a tablespoonful, or half an ounce for ten hogs, would be sufficient, and my own hogs get very much less."

Dr. Detmers gives, as the result of his investigations, the following conclusions respecting preventive measures: "The most effective means of prevention that can be applied by the individual owners of swine consists, first, in promptly destroying and burying sufficiently deep and out of the way the first animal or animals that show symptoms of swine plague, if

the disease is just making its appearance, and in disinfecting the premises, or, if that is difficult, in removing the herd at once to a non-infected place, or out of the reach of the infectious principle. If possible the herd should be taken to a piece of high and dry ground, free from any straw and rubbish — if recently plowed, still better — and there should receive clean food and no water except such as is freshly drawn from a well.

If this is complied with, and if all communication whatever with any diseased hogs or pigs is cut off in every respect, which is absolutely necessary, and still danger should be anticipated, for instance, if one or more animals should have become infected before the herd was removed, or a possibility of either food or water for drinking being or becoming tainted with the infectious principle should exist, the danger may be averted, or at least be very much diminished by administering three times a day in the water for drinking either some carbolic acid (about ten drops each time for every 150 pounds of live-weight), or some hyposulphite of soda (a teaspoonful for every 100 pounds of live-weight), till all danger has disappeared.

Second, where swine plague has been allowed to make some progress in the herd, or where the presence of the disease is not discovered until several animals have been taken sick or have died, others have become infected, the best that can be done is to separate at once the healthy animals from the diseased and suspected ones; to place the healthy animals by themselves and the doubtful ones by themselves; to separate, disinfect, and treat the animals in the way just stated. Special care must be taken to prevent any communication, direct or indirect, between the three different parts of the herd. If one person has to do the feeding, etc., he must make it a strict rule to attend always first to the healthy animals, then to those considered as doubtful and last to the sick ones, and must never reverse that rule, or go among the healthy hogs or pigs after he has been in the yard or pen occupied by the others.

If possible each portion of the herd should have its own attendant, who should not come in contact with any of the others. The separation must be a strict one in every respect; even dogs and other animals may carry the infectious principle from the diseased animals or from the yard occupied by them to the healthy hogs and pigs. Buckets, pails, etc., which are used in feeding the sick hogs should not be used for the healthy ones, because the infectious principle may be conveyed by them from one place to another. Last but not least, it is very essential that the yard or hog-lot occupied by the healthy portion of the herd be higher than that occupied by the others. If it is lower, and especially if it is so situated that water and other liquids from the other hog-lots can flow into it, or over it, the separation is worse than useless, for then the healthy portion of the herd will surely become infected unless the ground is exceedingly dry.

Third, whenever swine plague is prevailing in the neighborhood, any operation, such as ringing, marking by wounding, or cutting ears or tail, and castration and spaying particularly, must not be performed, but should be delayed until the disease has disappeared, or does not exist anywhere within a radius of two miles. If such operation should become absolutely necessary, the wounds must be dressed at least once a day with an effective disinfectant, for instance, with a solution of carbolic acid or thymol, till a healing has been affected.

Swine plague is very often communicated from herd to herd and from place to place by a careless, and, in some cases, even criminal contamination of running streamlets, creeks, and rivers with the excrements and other excretions of diseased hogs and pigs, and with the carcasses and parts of the carcasses of the dead animals. This source of the spreading of the disease can be stopped only by declaring such contamination of streamlets a nuisance and making the offense punishable by law. Allowing swine affected with the plague to have access to such streamlets should be considered as constituting good evidence of such a contamination, as also the throwing of dead hogs, or parts of a carcass, into such streamlets, creeks, or rivers.

The rendering tanks established in almost every locality in which swine plague is or has been prevailing, contribute very much, directly and indirectly, to the spreading of the disease. They contribute directly by disseminating the infectious principle wherever the tank-agents, who collect the dead hogs from the farmers, travel with their wagons; and by contaminating and infecting, in many instances at least, the waters of streamlets, creeks, and rivers with such parts of the dead hogs as are not worth rendering, but which constitute the principal seat of the morbid process. Indirectly they contribute by inducing the farmers to leave their dead animals lying around unburied, thus remaining a source of infection until the 'dead-hog man' comes and takes them away. If transportation of swine that have died of the disease is prohibited by law, the numerous rendering tanks will soon disappear, and another source of infection will thus be closed.

The disease is spread not only by the transportation of dead hogs, but also by that of diseased ones. That such is the case becomes apparent by the fact that swine plague in its spreading not only follows the course of streamlets, creeks, and rivers, but also travels along the line of railroads and public highways. All traffic in, and transportation of, diseased hogs and pigs, and of animals that have died of swine plague, should, therefore, be stopped; and sending diseased swine to market — a very common practice at present — should be made a criminal offense. Further, a law which would compel every owner of swine to take care of them, to confine them to his own premises, and not allow them to run at large on public highways, etc., would, if executed and complied with, do a great deal of good, and prevent a great many infections. It has happened very often that a stray hog or pig has carried the disease into a healthy herd; and, *vice versa*, it has happened also — perhaps just as often — that a hog or pig has become infected while among other swine and, coming home again, has introduced swine plague into the herd to which it belonged.

As to a treatment of diseased animals, there can be no doubt that a good hygienic treatment — a strict separation of the diseased animals from each other, so as to prevent any further influx of the infectious principle, is advisable. Swine diseased with the plague evince very often a vitiated appetite for the excrements and the urine of their companions, and as these excretions contain immense numbers of Schizomycetes, spherical and rod-shaped, and are therefore highly infectious, more and more infection or disease-producing elements will be introduced into the animal organism if that vitiated appetite is satisfied. Clean quarters and clean troughs (it is very important to clean the troughs after each meal), clean and fresh well-water to drink, clean food to eat, reasonable and adequate protection against the inclemency of the weather (against heat as well as against cold, rain, snow, etc.), and pure air to breathe, will go a good way and may save many an animal."

Burning the carcasses of hogs that have died of this disease is a safe and easy means of disposing of them. A little kerosene oil poured over the body, and a small amount of fuel, will soon accomplish the cremating process.

#### **Inflammation of the Lungs.** See PNEUMONIA.

**Inversion of the Vagina and Uterus.**—This occasionally occurs with swine, and is generally caused by difficult parturition. Wash the protruding parts carefully in clean, tepid water, then lubricate the hand in sweet oil, or fresh melted lard, and gently return the parts to their natural position. This should be done as carefully as possible, as the parts are very delicate in structure and easily injured. It should also be done as soon as possible after the inversion takes place. After being returned, it will be well to secure a truss of some kind over the part to prevent a recurrence of the same difficulty, which would be very likely to follow if this were not done. A well known veterinary surgeon records the following device in such cases:

"This is best accomplished by using a truss cut out of leather; an old boot top will do in case of emergency. A strap like a surcingle is passed around the body behind the fore-legs,

to which is attached four cords corresponding to four outer holes in the corners of the truss, to keep it in position. The two upper cords pass along either side of the spine, while the two lower ones pass down between the hind legs, and along either side of the belly. When secured in this way for a few days, the operation is generally attended with success, the parts soon returning to their normal condition."

The animal should be separated from the others and kept as quiet as possible for a few days. It would also be a good plan, if possible, to place the patient in a narrow enclosure so that it cannot turn round, and where the hind part of the body will be raised higher than the fore part, which will lessen the tendency of the parts being again inverted.

**Itch.** See MANGE.

**Lard Worm, etc.**—The internal parasites of hogs are numerous, the most common being those which produce the measles and trichinae, the lard worm, (*Stephanurus dentatus*), and the kidney worm (*Eustrongylus gigas*). The lard worm is from one to three-fourths of an inch long, and about one-thirteenth of an inch broad. It is found in nearly all portions of the body, but more frequently in the liver, the fat about the ribs, heart, and air passages.



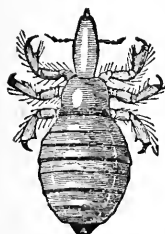
STEPHANURUS  
DENTATUS  
OR LARD  
WORM.

a, Male. d, Female.  
c, Head, magnified.

The kidney worm is found in the kidneys, upon which it lives until the whole is eaten, when it eats its way through into the intestinal cavity, causing death from nervous prostration and inflammation. This worm is sometimes found in the intestines, and grows from one to three feet in length, and from a quarter to a half inch in diameter. But little can be done by way of treatment for these parasites, and the animal had better be killed at once, to avoid all danger of extending the difficulty to others of the herd.

**Lice.**—It is much better to avoid these insect pests, and so save the trouble of exterminating them. Sulphur or Scotch snuff, mixed with lard, also tobacco water, are very effectual remedies. A common insect powder, *pyrethrum*, can be obtained of any responsible druggist, and if properly applied, will soon destroy them. Carbolic acid, mixed with three times the quantity of water, is also very effectual.

Another very simple remedy is to give the pigs a thorough washing with soft soap and warm water. It must, however, be remembered that the nits will hatch in from twelve to fourteen days, so that whatever be the remedy that is used, there must be a second application, in order to make the success complete. It is found also that if the cause of lice be not removed, all remedies will fail. Old bedding and manure must be all taken away, and the floors of the pens and feeding troughs must be thoroughly scalded with hot water, and the walls, fences, posts, and other objects against which the hogs lean or rub themselves should have one or two coats of whitewash, or be washed with crude petroleum, or kerosene oil.



HAEMATOPINUS.  
Blood-sucking louse of  
the pig.

Once in five or six weeks, during hot weather, it would be well to go over the entire pen with a mixture of kerosene in hot water, using an old whitewash brush for the walls, and a broom for sprinkling the floors well. Prevention is, however, much the easiest and best, and if the rules that govern health are observed, there will be no danger of

trouble with skin parasites of any kind.

**Malignant Epizootic Catarrh.**—This disease is generally brought on by a severe cold, although it is frequently generated and developed with great rapidity by filthy and ill-ventilated pens. The symptoms are a feverish condition, difficulty in breathing, panting, and hoarse cough. The head will droop, there will be a constipated condition of the bowels

usually, but sometimes an unnatural looseness. The animal seems weak, and walks with a stiff, tottering gait. It sometimes proves fatal in three or four days, but if the animal recovers, the duration of the disease will be about two weeks. If the animal be opened after death, the nasal passages of the upper part of the throat, the windpipe, and lungs will be found to be greatly inflamed, while frequently the spleen will be enlarged, soft, and of a dark color; the liver is also frequently affected. Separate the patient from all other animals, and give him a clean, well-ventilated pen. If the bowels are constipated, give one and a half ounces of castor oil mixed with a pint of milk; if there be a diarrhœa, give twenty grains of podophyllin, and two drachms of bi-carbonate of soda, mixed with the same quantity of milk. Apply to the chest and throat mustard and vinegar well rubbed in, or, if a blister seems necessary, a blistering ointment may be used instead, consisting of one ounce of cantharides and four ounces of olive oil. Give good nursing for a few days, and if the animal does not improve, we would advise killing it and burying it deep, where no other animal can come in contact with the carcass, and thoroughly disinfect the pen before putting other pigs into it.

**Malignant Sore Throat.**—The symptoms of this disease are similar to those of the above-mentioned malady. The animal seems dull and stupid, is disinclined to move about; will not eat; coughs and makes repeated efforts to vomit; the bowels are at first constipated, followed in the second stage of the disease with a fetid diarrhœa, and difficulty in urination. There is a difficulty in swallowing; red and purple spots appear around the throat, ears, heart, and between the forelegs. The throat and tongue will sometimes be so swollen that the latter will protrude from the mouth, and the animal will die of suffocation in a short time after the attack. Give two ounces of castor oil as soon as practicable in a pint of milk. Foment the neck and chest with hot water saturated with copperas; after which apply turpentine and sweet oil mixed in equal parts. After the castor oil has taken effect, give two or three times a day the following: 20 grains nitrate of soda, and the same quantity of nitrate of potash, mixed with a little milk or gruel.

**Mange.**—This is a troublesome disease of the skin, due to an insect (*Sarcoptes suis*), a species of acari, which produces a constant irritation or itching, accompanied with small eruptions of the skin on the surface of the body generally. It is similar to the itch in man, and is exceedingly contagious, never originating spontaneously, and requires that either the living parasites or their eggs shall pass from diseased to healthy animals. Like the scab in sheep, it is communicated by contact with anything that has been contaminated by the diseased animal, such as rubbing posts, sides of the pen, bedding, etc. A prominent veterinarian says:

“A most important point, very clearly established, is, that although any animal may accidentally be the carrier of contagion between other two—such as a cat or dog carrying disease from one horse to another—that it is essential for the development of a real mange on any animal that the insect should be proper to that animal. Thus men engaged around mangy horses, carry the malady from one animal to another, and suffer very slightly and only for a short time themselves. The parasite which lives on the horse does not live on man, and the parasite which lives on the sheep does not contaminate the shepherd's dog, though the latter may, like the shepherd, or the many rubbing places, pens, railroad trucks, etc., be the means whereby the malady spreads. It appears, however, that animals of the same genus, though of different species, may be attacked by precisely the same insect; thus, for instance, the cat, the lion, the tiger, and other feline animals, have one kind of insect common to all. The pig is perhaps less affected by this troublesome disorder than other animals; anyway it is the least observed.”

Considerable itching and uneasiness accompanies this disease, the animal frequently rub-

bing itself, and does not seem to thrive well. An examination with a sufficiently powerful magnifying glass will show these minute parasites under the scales of the cuticle.

Give the animal daily for a week or ten days  $\frac{1}{2}$  to  $\frac{3}{4}$  of an ounce of sulphur mixed with the food. Rub the animal thoroughly with soft soap, allowing it to remain on for three or four hours, after which wash off in warm water. When dry, apply an ointment of sulphur and lard in which a little petroleum is mixed. Rub this in thoroughly and let it remain three or four days; then wash again thoroughly with soft soap and water as before. If this does not remove the difficulty, repeat the application of the ointment as before. It will do no good to treat this disease unless the animal be removed to perfectly clean quarters, with clean bedding, etc. The old bedding should be burned and the pen thoroughly disinfected before using it again. This may be done by first cleaning out all the refuse and burying or burning it, and fumigating by closing all the doors and windows of the pen as tightly as possible, and burning sulphur for fifteen or twenty minutes, so that the smoke will penetrate every part; after which wash the walls and floor with petroleum, or apply a coating of whitewash.

**Measles.**—Measles in swine results from entozoa, or small internal parasites, which are embryo forms of the common tape-worm, being caused by eating the egg of the common tape-worm of man (*Tenia solium*). Measly pork is unfit for human food, and if eaten without being most thoroughly cooked will be sure to cause tape-worms, as the eating of trichina-infected pork will cause trichina. It is a well-known fact that dogs are subject to tape-worms, probably from eating raw flesh, hence they void the eggs of this parasite, and if swine come in contact with their excrement, they will be liable to become infected. In-and-in breeding, impure food, especially allowing swine to eat or root over the excrement of other animals, are the fruitful causes of this disease. No human excrement should ever be used for manuring swine pastures, or the land where roots are grown for pigs, especially when they are to be fed raw.

Contact with others of the herd having this disease should also be avoided. Too much caution cannot be used against breeding from pigs that have ever been affected with this disease, or permitting breeding sows to eat the droppings of other animals, or their own. Raw flesh, such as the refuse from the slaughter-house, should never be fed to pigs, as it may contain the embryo tape-worms, and will be liable to produce measles in the pigs that eat it, as in their progeny. The tape-worm is a flat-bodied worm closely jointed, the entire body being made up of small segments or joints from an eighth to half an inch in length, joined so as to make a depression between the segments. These worms sometimes attain the length of a hundred feet or more. The head is at the narrow end, and is globular in form, having circular sucking-discs, and a proboscis encircled by a row of small hooks by which it can attach itself to the inner coat of the stomach or intestines.

From the broad end of the body, the segments become detached or unjointed as it were, from time to time as they mature, and are expelled from the body of the animal. These small segments may frequently be seen wriggling along over the ground, grass, and vegetables where they chance to be deposited, and as they go leave an innumerable number of small eggs, which are taken up by grazing animals, more especially hogs. It is estimated by those who have given the subject a close investigation, that a single tape-worm lays upwards of 25,000,000 of eggs.

When one of these eggs is taken into the stomach of a hog, it hatches into a six-hooked embryo, which bores its way into the tissues, and there it encysts itself and remains a long time. A person eating flesh having such embryos will take into the stomach what will soon produce a tape-worm, which will cause intestinal pain, emaciation, nervousness, and sometimes convulsions and death.

**Symptoms, etc.**—On the skin of pigs affected with this disease will be found a number of small watery pimples or pustules of a reddish color; the animal coughs; is feverish,

and has a weakness of the hind legs, together with other indications of general debility. Sometimes there are pustules under the tongue and a discharge from the nose and eyes. Measly pork may readily be known by the cysts distributed through the muscular and other tissues of the body, some of which are about the size of a grain of wheat. The disease seldom proves fatal, still it is regarded generally as incurable in swine. It is more easily prevented than cured.

If, however, taken in the early stages, daily small doses of sulphur, saltpetre, or Epsom salts be given for two or three weeks, with a liberal supply of wholesome, nutritious, and easily digested food, the eggs might be passed from the stomach and bowels, but this is not certain. If possible, keep the animals from access to means of becoming infected with the disease, such as the excrement of human beings and dogs.

**Pneumonia.**—This is occasioned by a severe cold. The symptoms are a feverish state of the system, shivering of the body and limbs, quick, labored breathing, attended with more or less coughing and loss of appetite. Keep the bowels from being constipated by giving mild doses of Epsom salts, or castor oil, if necessary. Put the patient in a comfortable, clean, and well ventilated pen, and give good nourishing food, and all the pure water he will drink. Rub the chest and side frequently with a mixture of ground mustard and vinegar. Good nursing will generally affect a cure, sooner than medicines.

**Protrusion of Rectum (*Prolapsus Ani*).**—This is of not unfrequent occurrence in swine, especially among young pigs, and generally results from eating too much food of a constipating tendency, and from a lack of a variety of food. It also sometimes follows diarrhoea and difficult parturition. If the part protruded is not too badly swollen, and is red in color, it may be carefully washed in tepid water; after which, lubricate the hand with sweet oil, and gently crowd it back to its place. This must be done with great care. It may be well to apply a little laudanum or extract of witch hazel before returning the part. This should be followed by having the pig stand in a place where he cannot turn around, and where the hind legs will be elevated several inches higher than the fore legs. When the parts have turned quite black, and show signs of mortification setting in, it will be well to send for a skillful veterinary surgeon; and if necessary the offensive portion can be removed; but this will require a skillful use of the knife, and should not be done carelessly.

**Quinsy or Inflammation of the Tonsils.**—This is an inflammation of the glands of the throat, and is quite common with swine and sometimes fatal, as a hog is more easily suffocated by a swelling of the neck or throat than any other animal, especially if rather fat. The symptoms are denoted by a difficulty in swallowing, a swelling of the throat, and especially under the lower jaw and neck. The swelling is frequently so great as to cause the tongue to protrude from the mouth. The first thing to be done is to scarify the swollen parts with a thin sharp knife until blood issues freely; this will have a tendency to reduce the inflammation. Afterwards foment the parts with cloths wrung out in hot water, keeping them constantly applied to keep up a slight bleeding, and reduce the inflammation.

Give an injection of warm water with half an ounce of castor oil. Dissolve a teaspoonful of chloride of potassium in a tablespoonful of warm water and turn it down the throat of the patient, three or four times a day. The following is also a good remedy: two teaspoonfuls of spirits of turpentine mixed with the same quantity of melted lard. This may be given in a half-pint of gruel or milk, if the animal will eat; if not, swab the tonsils frequently with it, using a small stick with a sponge or cloth fastened around the end. Give the animal all the cold water it will drink, with a little vinegar and nitre mixed with it.

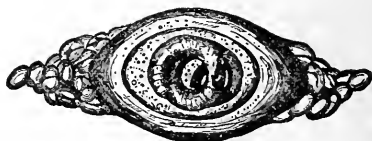
**Rheumatism.**—This is not uncommon with hogs, and results almost invariably from exposure to cold storms, sleeping in damp, filthy, ill-ventilated pens, or on the cold ground. To prevent the evil, provide warm, clean beds, with protection from dampness. For pigs

affected with rheumatism, Mr. Coburn recommends in treatment a tablespoonful of cod-liver oil once or twice a day, mixed with their food, which should be of a soft and nourishing character.

**Trichina.**—The disease known in the human family by this name is caused by a small parasite, which is generally found in the muscles of voluntary motion. This parasite is found in the muscles of all animals, but is most common in those of the human species, the hog, and rat. Trichinae are very small, varying from one-eighteenth to one-sixth of an inch in length. When encysted in the muscles, the cysts are slightly oval, as will be seen by the



ADULT INTESTINAL TRICHINA  
SPIRALIS. MAGNIFIED.



MUSCLE TRICHINA ENCYSTED. MAGNIFIED.

accompanying cut of a magnified one, taken from the muscles of a hog. The mature and fertile worm lives in the intestines of the animal and there lays its eggs.

As soon as the eggs hatch, the young trichinae at once migrate by eating their way through the intestines, and find their way into the voluntary muscles, and in course of five or six weeks from the time of hatching, they become encysted in the muscles, and will do no farther injury to the man or animal containing them, but during the five or six weeks in which they are migrating to the muscles, the great danger lies, as this is attended with pain, exhaustion, and emaciation, which frequently results fatally. When meat containing the encysted trichinae is taken into the stomach, it develops into a mature parasite which lays its eggs in the intestines, which soon hatch.

The symptoms are frequently mistaken for rheumatism, the muscles affected becoming swollen, sore, and painful, being attended with emaciation and exhaustion. Animals affected with trichinae seem dull, and disinclined to move about; there is a loss of appetite, and a soreness and stiffness of the body generally, especially the hind parts.

If they live through the sixth week of the disease they will recover, but their flesh should never be used for food.

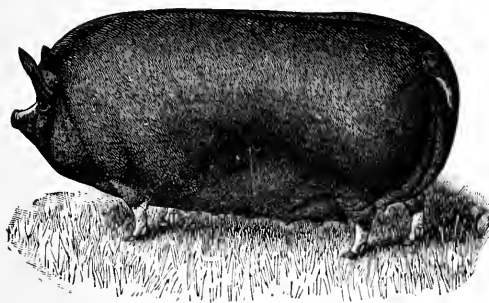
Prevention is about all that can be done, as treatment is of little avail. It usually happens that not until cutting up the meat and having it closely examined, that the disease is noticed. Hogs should never be fed on the offal from slaughter houses, or raw meat of any kind, and their pens should be kept free from rats and mice. Hogs should also never be permitted to have access to the excrement of human beings or dogs, as it may contain the eggs or embryos of the parasite. Pork should never be eaten that has not been well cooked, for trichinae will survive a temperature of 140°.

**Worms.**—When pigs have the usual appetite for food, and, although well fed, have an unthrifty appearance, it may well be suspected that something is wrong. A convincing proof that worms may be the cause of the difficulty may occasionally be had in such cases by finding them in the excrement. For diet, give a plenty of sour food, such as sour milk, sour fruit, also raw onions, acorns, potatoes, turnips, etc., and let them have access to charcoal and ashes, avoiding impure water from stagnant pools or other sources, at all times. Give

every other day for a week or two a tablespoonful of sulphur with the food, to be followed each alternate day with from fifteen to thirty drops of turpentine, regulating the dose according to the size and age of the pig.

**Use of Disinfectants.**—Barns, stables, sheds, hog houses, and in fact outhouses of every kind on the farm, may at times require the use of disinfectants, and especially those that have been occupied by animals sick with any contagious disease. One of the easiest and best methods of fumigating a building is to close all openings through which the smoke could escape, and burn sulphur and wood tar in the proportion of one pound of sulphur to two of the tar. Mix them with tow, and allow the smoke to become sufficiently dense to penetrate to every part of the building. It is also a good plan to fumigate stables a little two or three times a week, where animals are sick, but not sufficient to make them cough. The walls, floors, and every part of the building should be washed with diluted carbolic acid, and the blankets, etc., be wet with it. If the pure carbolic acid is used for this purpose, one pint of the acid will be sufficient for twelve gallons of soft water, or in the proportion of about one part carbolic acid to 100 parts of water. The impure carbolic acid obtained at gas works may be used without being diluted. Chloride of zinc in the proportion of one ounce to a gallon of water, should be sprinkled over the droppings of the stables or pens. All sick animals should be apart by themselves, and those having care of them should never approach or handle the well ones. Carbolic acid is not only a good disinfectant, but is useful in destroying the infectious principle in many respects. If, for instance, the food or water for drinking has become contaminated, carbolic acid may be given in ten drop doses each morning and evening, to a hog weighing 150 lbs., it being mixed with their liquid food. During the prevalence of contagious diseases, scratches and wounds should be treated with diluted carbolic acid, and in castrating any animals, the hands should first be washed in it.

Dry earth, lime, charcoal, and tar are among the disinfectants commonly used in pens and stables. Dry earth absorbs the liquids and destroys the odors of excrement, and also prevents unwholesome emanations. Lime is also excellent for this purpose, while charcoal is a powerful absorbant of gases. Common wood tar contains these properties in a less degree than those already mentioned, while chloride of lime is perhaps one of the best for all common practical purposes.



## BREEDS AND THE PRINCIPLES OF BREEDING.

**T**HE important relation that good farm stock holds to advanced agriculture is becoming daily more clearly recognized and appreciated by farmers generally; but how to produce animals that shall possess the desirable characteristics and qualities is not commonly understood, or demonstrated in practical results. To search out the rules which govern the results desired to be obtained, and to apply them in systematic practice, has been the work of eminent breeders of the past and present age, who have devoted much time, labor, and attention in determining these laws and applying them, until breeding has become an art, which has been carried to such a state of perfection that the breeder might almost be said to possess the creative art,—the power to determine beforehand the type of animal that will be produced; for instance, we have the horse intended for speed, for draft, for the saddle, and for the carriage; cattle designed for beef exclusively, or for beef and dairy products combined; the cow designed especially for milk production and cheese, and those designed particularly for the production of butter; sheep that will produce the long combing wool, that of a medium staple, and a short staple; sheep, the principal characteristic of which is wool production, or those characterized for the production of wool and mutton combined; swine that will yield a superabundance of fat, or those that will furnish the best quality of lean pork, suited for hams and bacon; poultry, the chief excellence of which is egg production, or in furnishing the best quality of table fowl; dogs that will render the farmer and herder most valuable service in the care of sheep and cattle, and those designed more particularly for assisting the sportsman, etc., all of which are proofs of the skill of the herder in establishing breeds for special purposes, by making use of the material at hand, in a judicious selection and combination based upon a knowledge of hereditary law, or what might more properly be termed the law of nature. Breeding in agriculture, is therefore the art of so selecting and coupling animals as to produce those best fitted for the purpose for which they are intended, and this art seems to apply uniformly to the breeding of all domestic animals.

It is only within the last two hundred years that careful and systematic breeding has been practiced in the rearing of cattle, while during the last fifty years more has been accomplished in the improvement of farm animals by judicious breeding than during all the time preceding in the history of agriculture. But little had been accomplished in a systematic way towards the improvement of British cattle until Bakewell undertook the improvement of the Long Horns. Subsequent to this the Collings improved the Durhams, sometimes called the Teeswaters, and hence we have the noted Short Horns of to-day, while later breeders developed the Devons, Herefords, etc. The fact is fully established in the historic records of the past that wherever agriculture has attained any advancement with a people, the domestic animals have always improved accordingly.

Nature works according to fixed rules, which are commonly termed natural laws. There may be certain exceptions to these rules, since difference in conditions will tend to difference in results; yet still there will be seen through all, a connected chain of evidence, showing the existence of well established laws.

**How Breeds are Formed.**—The term breeds is usually applied to the varieties of domestic animals. A breed is consequently a variety, and implies the existence of a group of individuals distinguished from others of their congeners by the possession of certain peculiar characteristics which are transmitted to their offspring; and it is this transmission of peculiarities which is the essential characteristic of a breed. The art of breeding may properly be said to consist in changing the conditions of life, and of regulating the reproduction

of animals and plants. The commonly recognized law of heredity is, that "like produces like," and this must hold true to a great extent, or the existence of breeds would be an impossibility; but if it were *absolutely* true, or it were an arbitrary rule which nature strictly enforced in every particular, it is evident that neither by man's interference nor the operations of nature could a new breed or race be produced, since the offspring would in all cases be identical with the parents. It seems, therefore, that owing to the exceptions to this general rule or law of nature, which renders it possible for difference in conditions and circumstances to produce different results, new breeds have arisen.

In plants, a new variety of species is produced by crossing one variety on another. In crossing two different species of a genus, a hybrid is produced, the fertility of which is generally destroyed, hence the hybrid rarely perpetuates its kind. Prof. D. C. Eaton, of Yale College, says respecting hybrids:

"It may therefore be said of hybrids generally, that they are either sterile, or, if fertile, that they will most frequently return, after a few generations, to their parent forms.

Hybrids can be produced only between nearly related forms. So true is this law believed to be, that Darwin seems to suspect the inaccuracy of any zoölogical classification which places in different genera animals between which hybridity is possible. Every story of a monster, half one thing and half something utterly different, no matter how high the authority for the story, is necessarily and absolutely false, and such fabled creatures must be relegated to the category of the minotaur, the centaur, and that product of the Mississippi valley, which is said to be 'half alligator and half horse.' Dogs cross freely with wolves and jackals, because these are all very closely related, but between dogs and all animals other than *canide*, or dog-like creatures, there is no possibility of hybridism.

So also in the vegetable kingdom: there is no hybridizing of unrelated plants. The apple and the wild American crab-apple have been hybridized, and I believe, with the result of producing a valuable fruit; but any attempt to hybridize the apple and the peach, or the plum and the pomegranate would be utterly vain. Various kinds of grapes have been hybridized with most valuable results. Very many kinds of cultivated strawberries are the outcome of successful hybridizing, and it is probable that a good many of our fruits have in them the strains of more than one original species. But it should be remembered that these kinds of grapes, strawberries, plums, gooseberries, etc., are not permanent *varieties*, using the word in its proper sense; they are only hybrid or mongrel productions, with individual peculiarities, but multiplied by division of the root stocks, by runners, by grafting, by budding, by slips. None of them could be depended on to reproduce itself by seed, and if the seed should grow at all, which is not always certain, the offspring would in all probability show strong tendencies to revert to one or both of the original parent forms."

When two animals or plants of the same species are crossed, but differing one from the other, the product will be fertile, though not in so great a degree as in those of a like kind.

In such cases the offspring will resemble one parent more strongly than another, and these varieties will be very liable to reappear in after generations. This reversion to remote ancestry, commonly termed atavism, is seen in many breeds, notwithstanding the care taken in breeding, and the many years passed after the particular cross was made.

Prof. W. H. Brewer, of Yale College, says in regard to forming new varieties of plants, "Suppose that suddenly, by a miracle, every kind of cultivated apples in the world were swept out of existence, and we were left with only the original wild stock to begin anew with, but had all our present knowledge bearing on the question of again recovering the lost treasure. How should we go to work; what methods and means has science and art to suggest, whereby to transmute that small, sour, acrid, puckery crab-apple into the luscious and various kinds of apples we had lost, and change the crabbed, thorny shrub of the hedges into the comely, thornless tree of the orchards?"

This would be the course: We would plant a large number of seeds in various soils and under varied conditions, choosing the seeds from promising and thrifty plants. When the trees were grown and produced their fruit, we would choose for the second planting the seeds of such fruits as deviated most widely from the parent, both for better and for worse. The next generation the same—again choose the most diverse forms for seed; choose the fruit differing as widely as possible from the parent, from each other, and from the ancestral stock. The variations for some generations might be slight, but there would be *some* variation. I have already said that the law of heredity tends to make offspring *like* the parent, but we choose offspring as *unlike the parent as possible*, for a few generations, and thus the force of heredity in *any one direction* is lessened, until at last we would have the tendency to sport so enhanced that the forms produced would be very numerous. Then we would select those best for our use, and propagate them by slips, grafts, buds, or cuttings.

The two noted horticulturists, Vilmorin, father and son, for more than half a century carried on a series of experiments on this method of breaking up the direction of heredity, and making varieties. When the father died the son continued the work which the elder had begun and the two for a time pursued together. He published the results some twenty-five years ago, and all the more recent and rapid advance in our knowledge of the laws and phases of vegetable growth only confirm their conclusions. Gardeners all agree that in bringing a wild species into cultivation, it usually, at first, for some generations, shows but slight disposition to change or sport; that after a time sporting begins, and then it rapidly increases. Instances of this among ornamental plants, like the dahlia, chrysanthemum, etc., are too numerous and well-known among gardeners to need more reference here.

With some Old-World fruits the process has gone on so long, and so many influences have been at work, that now it is *the rule* that the fruit of the seedling *should be unlike* the parent, and all the various and choice varieties of apples we now have are the selections of countless thousands of varieties which have arisen in the various lands where apples have been grown, and during the long ages apples have been cultivated. Time has been an essential factor in this work; for ages the number of varieties were few compared with what we now know; we are now reaping the rich harvest which our race has been sowing all these many centuries."

The difficulties in forming a new breed will hence be seen, as these varieties will sometimes suddenly appear after breeding true for several generations. It is not advisable to attempt to form a new breed out of incongruous materials that may happen to be at hand, for it would be sure to result in failure. It will be far better to select from breeds already formed, according to the use for which they were intended, than to attempt to establish a new one, that perhaps after fifty or a hundred years will be no better, if as good, as some breeds we now have, that are the result of many generations of careful breeding. In establishing a breed the main principle which breeders have adhered to, is to always select the best individuals in each generation for breeding purposes. In the art of breeding there are recognized three principles or laws, viz.: heredity, variability, and selection; the first two relate to the qualities of the animals which render the art practicable, and the last to the art of man. Whatever the breed or its characteristics, good feeding, good shelter, and judicious management generally, combined with careful selection, will do much towards maintaining and perfecting the desirable qualities. Lack of proper care and injudicious selection will soon destroy the effects of previous good management and careful breeding. "Bad feeding will soon mar good breeding," is an old maxim that should be more generally understood by farmers, and their practice modified accordingly. No matter how good the animal may be, in itself, or how carefully its ancestors have been bred for previous generations, the pedigree will soon be of little avail, if it is stunted in growth by being kept in a half-starved condition, and permitted to shift for itself generally. Good feeding should always be combined with good breeding in order to attain the best results.

**Atavism.**—Webster defines atavism as denoting “the recurrence of any peculiarity or disease of an ancestor in a subsequent generation, after an intermission for a generation or two.” Dana defines it “the recurrence of the original type of a species in the progeny of its varieties.” This occasional reversion, or “cropping out” of the peculiarities or types, is frequently seen in perpetuating the races of animals and plants, and may properly be said to be due to the power of hereditary law, by which characteristics are transmitted from one generation to another. Thus we occasionally see horns in the Galloway, Suffolk, and other breeds that have been bred hornless for many generations, but which were originally a horned race of cattle. Sidney cites a remarkable case of atavism in a litter of Essex pigs, two of which showed the Berkshire cross of twenty-eight years previous. Numerous instances of the kind might be mentioned, showing that in animals and plants there is a constant tendency in nature to revert to the original type, and this is what the breeder has to constantly guard against, by always selecting those types of the breed for perpetuating the race that possess the qualities it is desired to have transmitted; in other words, always select the *best* for breeding purposes.

**Heredity.**—The power of animals to propagate their own characteristics is hereditary, or transmitted from one generation to another. It is one of the principles of breeding that the strongest and best-bred animals will have the predominating influence over the offspring. The more powerful this inheritance, and the stronger the in-breeding,—avoiding incest,—the more surely will these characteristics be transmitted to the progeny; or, in other words, the purer and less mixed the breed, the more likely it is to be transmitted unaltered to the offspring.

Darwin says: “It is hardly possible, within a moderate compass, to impress on those who have not attended to the subject the full conviction of the force of inheritance, which is slowly acquired by rearing animals, by studying various treatises which have been published on the various domestic animals, and by conversing with breeders.” He refers to certain peculiarities that have appeared but once or twice in the world’s history, but which have reappeared in children or grandchildren of the individuals so characterized; as for instance, Lambert, known as “the porcupine man,” whose skin was covered with warty projections which were periodically moulted, had all of his six children and two grandsons affected in a similar manner. Other striking instances of inheritance in man might be mentioned, and which are everywhere apparent, such as peculiarities of form, feature, temperament, and even disease, for injurious peculiarities may be inherited quite as readily as those that are beneficial.

Nearly all the diseases to which the horse is subject are hereditary, such as contracted feet, curbs, splints, spavin, founder, weakness in the fore legs, roaring, specific ophthalmia, blindness, crib-biting, etc. The very existence of the numerous breeds of domestic animals is convincing proof of the possibility of the transmission of characteristics of every kind, instance of which has been given in the varieties of domestic pigeons, which amount to over one hundred and fifty, all differing from each other, and yet breeding true to their kind. It is well known that a race of cattle was formed in Yorkshire many years ago, called “Dutch buttocked” cattle, which were characterized by having very large hind quarters. This race was formed by selecting for breeding purposes in each generation the animals having the largest hind quarters. This peculiarity became so marked when the herd began to be established, that the large size of the hind quarters of the calves were found to greatly increase the dangers of parturition. A rabbit born with only one ear became the founder of a breed which steadily produced one-eared rabbits.

Animals that have been mutilated have been known to transmit these peculiarities to their offspring, as for instance, guinea pigs that had lost their toes have in several instances produced offspring without toes. Dr. Miles, in his work on Stock Breeding, has collected

numerous instances of acquired and abnormal characteristics and illustrations of heredity, some of which we insert, since they serve to illustrate this power in animals so forcibly. The tendency to lay on fat rapidly, and to mature early is inherited in the best families of Short-horns, Devons, Herefords, and other meat-producing breeds, while the ability to secrete an abundant supply of milk is in like manner perpetuated in the Ayrshires, the Jerseys, and other dairy breeds.

The certainty with which these acquired qualities are transmitted constitutes one of the most valuable peculiarities of a breed. The American trotting horse furnishes another illustration of the inheritance of acquired characters. The various breeds of dogs have peculiarities that have been developed by a long course of training, which are transmitted with a uniformity that is surprising. Young setters, pointers, and retrievers, that have never been in the field, will often "work" with as much steadiness and ability as those that have had a long experience in sporting. In such cases, however, it will be found that the ancestors, immediate or remote, have been well trained in their special methods of hunting. The Shepherd dog is remarkable for its sagacity and the persistence with which it carries out the wishes of its master; and it would be difficult, if not impossible, to train dogs of any other breed to equal them in their special duties. The Greyhound runs by sight, and the Blood-hound by scent, and their offspring all inherit the same peculiarities. The curious fact was observed by Mr. Knight, that the young of a breed of Springing Spaniels which had been trained for several successive generations to find woodcocks, seemed to know as well as the old dogs what degree of frost would drive the birds to seek their food in unfrozen springs and rills.

A new instinct or peculiar characteristic has also become hereditary in a mongrel race of dogs employed by the inhabitants of the banks of the Magdalena almost exclusively in hunting the White-lipped Peccary. The address of these dogs consists in restraining their ardor and attaching themselves to no individual in particular, but keeping the whole in check. Now, among these dogs some are found which, the very first time they are taken to the woods, are acquainted with this mode of attack, whereas a dog of another breed starts forward at once, is surrounded by the peccaries, and, whatever may be his strength, is destroyed in a moment. A race of dogs employed for hunting deer in the plateau of Santa Fé, in Mexico, is distinguished by the peculiar mode in which they attack their game. This consists in seizing the animal by the belly and overturning it by a sudden effort, taking advantage of the moment when the body of the deer rests only upon the forelegs, the weight of the animal thus thrown being often six times that of its antagonist. Now, the dog of pure breed inherits a disposition to this kind of chase, and never attacks a deer from before while running; and even should the deer, not perceiving him, come directly upon him, the dog steps aside, and makes his assault upon the flank.

On the other hand, European dogs, though of superior strength and general sagacity, are destitute of this instinct, and, for want of similar precautions, they are often killed by the deer on the spot, the cervical vertebræ being dislocated by the violence of the shock. Mr. Lewes had a puppy taken from its mother at six weeks who, although never taught to "beg" (an accomplishment his mother had been taught), spontaneously took to begging for everything he wanted; when about seven or eight months old, he would beg for food, beg to be let out of the room, and one day was found opposite a rabbit-hutch apparently begging the rabbits to come out and play. A dog, owned by myself several years ago, inherited the same accomplishment from his mother, who had been trained to sit in an erect position and hold a stick in imitation of a soldier with a musket. This dog was taken from his mother when but a few days old, and before it had an opportunity of learning any tricks by imitation. Without any training, when a few months old, he assumed the erect position whenever anything was wanted, and, if that did not attract attention, he would "speak" with a short bark, as his mother had been in the habit of doing.

Dr. H. B. Shank, of Lansing, informs me that a cat owned by him had learned to open doors that were secured with a latch, and all of her descendants inherited the same peculiarity; while another family of cats, brought up with them, did not learn the trick, although they had sufficient intelligence to ask the assistance of their more expert friends when they wanted a door opened. Girou de Buzarringues reports the frequently-quoted case of a man who had the habit, when in bed, of lying on his back and crossing the right leg over the left. One of his daughters had the same habit from birth, and constantly assumed that position when in the cradle. Darwin reports the interesting case of a boy who had the singular habit, when pleased, of rapidly moving his fingers parallel to each other, and, when much excited, of raising both hands, with the fingers still moving, to the sides of his face on a level with his eyes; this boy, when almost an old man, could hardly resist this trick when much pleased, but, from its absurdity, concealed it. He had eight children. Of these, a girl, when pleased, at the age of four and a half years moved her fingers exactly in the same way, and, what is still more odd, when much excited, she raised both her hands, with her fingers still moving, to the sides of her face, in exactly the same manner her father had done, and sometimes still continued to do when alone.

The handwriting of members of the same family is said to frequently present a marked resemblance; and it has been asserted that English boys, when taught to write in France, naturally cling to their English manner of writing. There are families in which the special use of the left hand is hereditary. Girou mentions a family in which the father, the children, and most of the grandchildren, were left-handed. One of the latter betrayed its left-handedness from earliest infancy, nor could it be broken of the habit, though the left hand was bound and swathed.

Wild animals, living on islands not often visited by man, do not fear him, but allow the closest approach without hesitation. When the Falkland Islands were first visited by man, the large, wolf-like dog (*Canis Antarticus*) fearlessly came to meet Byron's sailors, who, mistaking this ignorant curiosity for ferocity, ran into the water to avoid them. Even recently, a man, by holding a piece of meat in one hand and a knife in the other, could sometimes stick them at night. On an island in the sea of Aral, when first discovered by Butakoff, the Saigak Antelopes, generally very timid and watchful, did not fly, but, on the contrary, looked at the visitors with a sort of curiosity. So, again, on the shores of the Mauritius, the Manatee was not, at first, in the least afraid of man, and thus it has been in several quarters of the world with seals and the morse. Quadrupeds, and also birds which have seldom been disturbed by man, dread him no more than do our English birds, or the cows or horses, grazing in the fields.

Dr. Kidder, in his description of the "Sheath-bill" (*Chionis minor*), on Kerguelen Island, says: When I sat down upon a rock and kept perfectly still for a few moments, they crowded around me like a mob of street boys around an organ-grinder, and all seemed perfectly fearless and trustful. That the descendants of such animals, inheriting the accumulated experience of their ancestors, become wild, is shown in the instinctive dread of man exhibited by the young of the same and allied species that are frequently brought into contact with him. G. Leroy observes, that in districts where a sharp war is waged against the fox, the cubs, on first coming out of their earths, and before they can have acquired any experience, are more cautious, crafty, and suspicious, than are the old foxes in places where no attempt is made to trap them. Knight, who for sixty years devoted himself to systematic observation of this class of facts, says that during that time the habits of the English woodcock underwent great changes, and that its fear of man was considerably increased by its transmission through several generations. The same author discovered similar changes of habit, even in bees.

The marked heredity of habits has led some modern writers to claim that the instincts

of animals are but the experiences of past generations, that are accumulated and established through inheritance. Many of the most valuable characteristics of the various improved breeds of animals have been produced by the inheritance of habits of the system, arising from the conditions and treatment to which they have been subjected. The remarkable records recently made by the American trotting-horse are the result of training and inheritance. The dairy breeds of cattle inherit a marked functional activity of the lacteal glands, which is but a modified habit of the system. Pritchard, in his *Natural History of Man*, states that the peculiar ambling pace to which the horses bred on the table-lands of the Cordilleras are trained has, by inheritance, resulted in a race in which the ambling pace is natural and requires no teaching. The Norwegian ponies, descended from animals that have been in the habit of obeying the voice of their riders and not the bridle, are said to inherit the same peculiarity, so that it is difficult to break them to drive in the ordinary way.

The habit of migration at particular seasons of the year is inherited, and I have often observed it in Mallard Ducks bred for several generations in a state of domestication. It must be admitted, however, that acquired habits are not in all cases hereditary, but it would be difficult, perhaps, in the present state of our knowledge of the subject, to fix a limit to their inheritance, so far, at least, as a predisposition is concerned. Acquired habits and the original traits of animals appear to be conflicting elements in their constitution, either one of which may, from its intensity, predominate in hereditary transmission. Pigs have been taught to point game and to perform various tricks, but, in the hereditary transmission of their characters, nature has had a stronger influence than culture possibly could have done.

Carpenter, in discussing the heredity of acquired habits, says: There seems to be reason to believe that such hereditary transmission is limited to acquired peculiarities which are simply modifications of the natural constitution of the race, and would not extend to such as may be altogether foreign to it. From a practical point of view, however, the inheritance of acquired characters, so far as they are of any value, is, fortunately, without any apparent limit. Abnormal characters are frequently hereditary, but they are not so likely to be transmitted as acquired habits that are in harmony with the original peculiarities of the animal.

The following examples will sufficiently illustrate this form of inheritance: Gracio Kellea, the Maltese, was born with six fingers upon each hand, and a like number of toes to each of his feet. He married when he was twenty-two years of age. The result of that marriage was four children; the first, Salvator, had six fingers and toes like his father; the second was George, who had five fingers and five toes, but one of them was deformed, showing a tendency to variation; the third was Andre—he had five fingers and five toes, quite perfect; the fourth was a girl, Marie—she had five fingers and five toes, but her thumbs were deformed, showing a tendency toward the sixth. These children grew up, and, when they came to adult years, they all married, and of course it happened that they all married five-fingered and five-toed persons. Now let us see what was the result. Salvator had four children—they were two boys, a girl, and another boy—the first two boys and the girl were six-fingered and six-toed like their grandfather; the third boy had only five fingers and toes. George had only four children; there were two girls with six fingers and six toes; there was one girl with six fingers and five toes on the right side, and five fingers and five toes on the left side, so that she was half-and-half. The last, a boy, had five fingers and five toes. The third, Andre, you will recollect, was perfectly well formed, and he had many children whose hands and feet were all regularly developed. Marie, the last, who of course married a man who had only five fingers, had four children; the first, a boy, was born with six toes, but the other three were normal.

The fifth toe of Dorking fowls, which is one of the characteristics of the breed, has been inherited, it is claimed, from a five-toed variety introduced into Britain by the Romans.

Whether this is true or not, it is now impossible to determine, but the constancy of this peculiarity, even in the produce of other breeds crossed with the Dorking, would seem to indicate that it is a character which has been fixed by long-continued inheritance. In the Houdan fowls, when first introduced into England from France, a fifth toe was rarely seen, but at the present time it is nearly as constant in this breed as in the Dorkings.

Herbert Spencer very justly remarks, in connection with the monetary aspect of breeding: "Excluding those inductions that have been so fully verified as to rank with exact science, there are no inductions so trustworthy as those which have undergone the mercantile test. When we have thousands of men whose profit or loss depends on the truth of the inference they draw from simple and perpetually repeated observations; and when we find that the inference arrived at and handed down from generation to generation of those deeply-interested observers has become an unshakable conviction, we may accept it without hesitation. In breeders of animals we have such a class, led by such experiences and entertaining such a conviction,—the conviction that minor peculiarities are inherited, as well as major peculiarities."

A difference in conditions will frequently lead to different results, as is instanced by the physical changes brought about in animals by a change of food, climate, etc. It is stated by good English authority that none of the English breeds of sheep can be kept absolutely pure in France, the lambs of even the first generation losing vigor as the heat of summer comes on, and the breed soon becomes degenerate. Notwithstanding the changes brought about by different conditions, there is a fixed law of heredity clearly recognized in breeding, which is to a greater or less extent under the control of the breeder, hereditary powers being capable of becoming increased or diminished, according to the course pursued.

**Variability.**—It sometimes happens that the offspring differ very materially from the parents. In many instances this will be due to a reversion to the original type, the variation being derived from some remote ancestor, the peculiar characteristics of which are occasionally seen cropping out in successive generations. Such cases will properly be classed with those of reversion, and not of true variation, where external causes may produce some constitutional or other change in the parent, which being transmitted to the offspring becomes correlated with some other change, which causes new characters to make their appearance. Hence, in selecting a certain character many other peculiarities may become correlated with the first or original one. It is a principle in breeding that all true changes or modifications which occur influence subsequent developments of the same parts, and also of others with which they are intimately connected. Dr. E. L. Sturtevant, in referring to correlated variations, says:

"In the correlations between bone and hair, we have different structures built up in part from the action of the same forces, as is shown by the history of their development. We therefore have a certain affinity between them, and a change impressed on one is apt to be followed by corresponding changes in the other. Were we sufficiently acquainted with the forces which go towards making up the animal, the numerous immediate forces could be referred to successive intermediate forces, into which they could be grouped, until finally the simple force would be reached,—a conception expressed by vitality in the abstract. Correlation is consequently but another expression of persistence of force. It is a recognition of the mutual dependence of all structures upon simple, harmonious law."

Prof. Brewer, an authority previously referred to in this department, expresses his opinion on this subject as follows:

"Heredity is not the only influence or force at work in the production and growth of the living plant. The seed is a marvelous thing; it is commonly very small, compared with the mature plant,—a seed of the giant *Sequoia* of California is no heavier than a mustard seed,—yet, stored in that little grain are all the powers derived from parents and ancestors

reaching backward to Creation, and all the possibilities of future generations of giants like the ancestors. Wonderful, however, as are the powers of that seed, after all they are only *possibilities*; other influences must aid or its power and being ends when it falls from the parent tree. Water must moisten it, and the sun warm it, or it will never even sprout, and if it grows, all through its life, earth and air and sun play each their part and do their work on its plastic nature.

Heredity gives direction to the growth, but it only partly controls it; all through life those elements which nourish it also modify it, and thus it naturally happens that the new plant is never quite like its parent. It may live in a better soil and grow larger, or be starved and be smaller, or other influences help to shape it, but whatever new character it takes on becomes a part of its being, and then heredity tries to transmit the new character to the next generation. There is *one* reason why the many individuals which constitute a species should differ among themselves, and why *cultivation* should tend to make the differences still greater, because art can supply conditions to influence growth which a plant growing wild would never find.

There is perhaps also an innate tendency to vary, inherent in living beings, a biological law opposed to heredity, weaker than heredity, always working with it, yet never strong enough to overcome it. This, however, is merely a hypothesis: personally, I believe in the existence of such a tendency, but many persons hold an opposite opinion. But whatever may be the cause, we see variation both in wild and in cultivated plants not explained by any obvious external cause. I will illustrate: Suppose we go into a field all white with the common ox-eye daisy. Instead of examining to see how near they are alike, as former botanists used to do, rather let us examine, say a thousand flowers, to see how they differ. All are daisies, but some are larger and some smaller, though growing side by side and nourished by the same soil and air; some have broad rays, others have narrow ones, some long and others short ones; in some the head is flatter than in others; some have the scales of the calyx closer than others, and so on through every character we examine. Now, experiment has abundantly proved that if we select plants having any one variation, plant its seeds and from the next generation again select the plants having that same peculiarity in the most marked degree, we will find that from generation to generation the successive crops, or at least some of each crop, will vary in that direction more and more from the original form, and in a few generations, more or less, we will make a new variety having that peculiarity in an exaggerated degree. We add up the slight variations until we have a large sum represented, and then this is a *variety*. I say this has been abundantly proved by experiment, and our gardens and fields are filled with the results. What the possibilities are of thus accumulating special character, no one knows; on its possibilities is based the Darwinian hypothesis.

What its applications are the race has known perhaps for thousands of years, for on it is founded, practically, the only means we have of *improving* any variety after it is once in existence."

There is probably no doubt that the unnatural and changeable conditions associated with domestication have more of a tendency to induce variations in organisms, than the conditions associated with a state of nature, hence, as a rule, wild animals breed truer than those domesticated, and there are fewer variations. Analogous variation is a term applied to those cases in which varieties of one species resemble distinct but allied species. Whenever this occurs it is supposed to be due to the two species having originated from the same source, or from their having a common progenitor, hence the modifying causes evolve similar varieties because of the similarity of the material which these forces have to act upon. Analogous variation is therefore closely allied to reversion.

It is evident that organisms propagated by sexual reproduction are generally most

liable to variation, since the offspring in such cases has a double chance of being influenced by conditions affecting the parents.

**Selection.**—In the whole theory of generation, there is no one principle of so much importance as selection, this being generally acknowledged as the chief element in successful breeding. To select judiciously animals which shall be successful pro-creators of their race, requires a correct judgment, nice discrimination, and a thorough knowledge of the art of breeding, and what has been distinguished by Darwin as *methodical selection*, which always implies that the breeder has before his mind a model upon which he attempts to form his strain, and like the potter who moulds his clay, the sculptor who chisels from rough marble, or the artist who causes dull canvas to speak in outline and varying tints of harmonious colors,—the breeder must have an ideal form or model after which he is to fashion the coming animal.

And not only must he have in mind the ideal form or model to imitate, but he must be able to decide which animals the most nearly approach this ideal, and also which are best suited to be paired together in order to produce the result desired. Breeding is therefore a real science in every sense of the word, and deserves to be classed among the high arts, while the masters in this art,—those who have been the most successful, in the past or present, are men of real genius.

Much patience, time, and labor are required in either establishing or perfecting a breed. Sir John Sebright is said to have spent several days in considering the rival merits of five or six birds, while founding the breed of fowls that bear his name. Hammond, the famous breeder of Merinos, is reputed to have reared 300 rams of this breed, and selected from them only one that he considered of desired perfection to be used in his own flock. It is said of Lord Rivers, who was noted for breeding elegant greyhounds, that he drowned nine out of every ten puppies among the litters of his choice kennel.

Chancellor Livingston bred his Merinos up from four or five-pound fleeces, to eight or nine pounds. Some of our modern breeders have attained the almost incredible result of producing fleeces weighing from sixteen to thirty-six pounds, the percentage of wool to live weight ranging from sixteen to twenty-two per cent. And this has been done by methodical selection, combined with good care and other favoring conditions. In Germany the Merino sheep farmers do not even trust their own judgment in selecting animals for breeding purposes, but employ what are called professional "sheep classifiers" for this purpose. Bakewell, who was the first true methodical breeder of which we have any definite knowledge, bred almost entirely for early maturity, and fattening qualities, and we have in the improved Shorthorns a breed that gives evidence of the astounding result of his efforts.

To show what the intelligent breeder has accomplished, we ask the readers to compare the illustrations in this work of the Texas and Longhorn cattle, with those of the improved Shorthorns, Herefords, and other choice breeds of the present day; the Wild Boar, Old English, and Old Irish hogs with the Berkshire, Poland Chinas, and other improved breeds of swine, or the cuts of sheep which were bred fifty or eighty years ago with the fine specimens from the flocks of Merinos, Cotswolds, Oxford Downs, etc., of our best breeders of these animals. The changes wrought are indeed wonderful, and yet they have been brought about mainly by careful selection.

The purer the blood of breeding animals, the longer and more firmly fixed will be the qualities and characteristics, and the more uniformly and intensely will these characteristics be transmitted. For instance, the Devon cattle are uniformly red, and no other color can be obtained from pure blood of this breed, because from time immemorial this color has been established by hereditary transmission. If the sire and dam both have fixed characteristics of a similar type, they will transmit them to their progeny as surely as the Devon bull enstamps his color on his get. Where the characteristics of the parents are of a similar type, those

qualities will therefore be intensified in the offspring; but where they are of a different or opposite type, the parent possessing the strongest hereditary powers will influence the offspring, but these characteristics will become weakened in time, unless the proper selection be made in successive generations.

**The Best Animals of the Breed should be Selected.**—No matter how pure the blood, individual differences are great, and some pure-bred animals possess the desirable qualities in a much greater degree than others; consequently in breeding, although the animals may have a long and faultless pedigree, select for breeding purposes the best of these, that is, those having the qualities most marked that it is desired should be transmitted. Even among the splendid race of thoroughbred horses, we find but few of great speed and superlative excellence. Huxley says:

“By selective breeding we can produce structural divergences as great as those of species, but we cannot produce equal physiological divergences.”

Methodical selection, as practiced by modern breeders, has resulted in producing wonderful changes, in our domestic animals, and yet an unrecorded cause of modification has doubtless been long in existence, a cause which has been termed “unconscious selection,” an instance of which has been given by Youatt, who, in remarking upon two flocks of New Leicester sheep owned respectively by Messrs. Buckley and Burgess, states that both of their flocks had been purely bred from the original stock of Mr. Bakewell for upwards of fifty years, and that there was not a suspicion existing in the mind of any one at all acquainted with the subject, that the owner of either of them had deviated in any one instance from the pure blood of Mr. Bakewell's flock, and yet the difference between the sheep owned by these two gentlemen was so great that they had the appearance of being quite different varieties. It is evident that neither of these breeders intended to alter the character of his flock, but endeavored to produce the best sheep of this breed possible, and hence, selected those for breeding purposes which approached most nearly to his ideal of a perfect New Leicester sheep; but owing to the different standards of excellence aimed at by these two breeders, the great difference arose. Even differences so slight as to be scarcely perceptible by the breeder may in the course of years produce changes so obvious that animals thus bred may seem like different varieties.

With respect to breeding for purity of blood, the object being to create and preserve a fixity of type, we must select animals possessing the same characteristics in order that we may invariably reproduce the good characteristics with greater certainty, and in an improved form in the offspring. If the individual animals be well selected, we shall in every generation gain stronger and stronger hereditary power and permanence of qualities. We shall concentrate the peculiarities of the race or breed. But we must avoid, as far as possible, any opposing influences in the parents, as tending to weaken the hereditary tendency in the young. We are to avoid anything like crossing, with the strictest care.

**Respective Influence of the Sire and Dam.**—If the sire and dam possess qualities and characteristics alike, they will transmit these qualities with force to their offspring; there will be a uniformity in their progeny that could never be obtained from parents of dissimilar characteristics. The nearer the parents are alike, the more certain will they transmit their qualities to their offspring, while when the two parents possess opposing or unlike qualities, the one which possesses the strongest hereditary qualities, or the strongest power of transmitting his qualities, will gain a preponderating influence over the offspring. Take, for instance, a cow with some special peculiarity of form, and breed her to a bull having points of form quite opposite in this respect, and the calf will take the character, so far as this peculiarity of form is concerned, of the parent which possessed the greatest hereditary power, or the greatest purity and unity of influence,—what we may call fixity

of type. And these hereditary powers are very largely under our control, to be increased or diminished by our own course of action.

If we take two animals to breed together, both possessing a strong similarity of type, the result we shall have will be an offspring possessing the like character, but in a higher degree. The result of putting together two animals of a strong similarity of characteristics is not only to perpetuate their corresponding peculiarities, but to intensify them in the offspring; that is, if the parents actually possess a striking similarity of type in any given point, each successive generation which they produce receives an increase of hereditary force, or an increase of power in transmitting its peculiar stamp upon its young. It is a cumulative power. But if this hereditary power accumulates, and becomes stronger and stronger, with a strong similarity in the parents to start from, it absolutely and invariably diminishes, if the parents, instead of possessing similarity of character, really possess an opposite or antagonistic character.

It reminds us of the familiar and well-known principle of mathematics, that two plus or positive quantities multiplied together will produce a far larger plus or positive quantity as the product; while if we multiply two unlike quantities, a plus and a minus, for instance, the result will be a minus, or negative quantity.

Professor Tanner, who is entitled to be regarded as high authority on this and kindred subjects, puts the matter somewhat like this:—

Suppose, for example, we have a well-bred ram, that, by long and careful breeding through several generations, has acquired certain strong and valuable hereditary powers, and suppose these powers, for the sake of illustration, are equal to 100, if they could be expressed in figures. Now, suppose we put this ram to a ewe of a different character, one that has been cross-bred, or bred without any care or system,—very much as our native sheep or our common cattle have been bred. She has, of course, far less hereditary power, far less fixity of type and strength of blood, as we say. Her hereditary power may be represented, we will suppose, by 60.

The result would be a lamb possessing very much the same characteristics as the ram, because we have seen the ram possessed a greatly superior hereditary power. To the eye he may look very like his father: but the hereditary capacity of this lamb will be greatly reduced, and his power of transmitting his peculiar characteristics will be represented by  $100 - 60 = 40$ . He may still look to the eye about as good as his father; but he will possess less than half his father's hereditary power, and less even than that of his mother. In other words, he may have all the perfection of form and marked characteristics; but his power of transmitting these peculiarities will be only in the proportion of 40 to 100, and for a breeding animal to get stock from he will be worth less than half as much as his sire.

In other words, if you select animals of a similarity of type, that is, if the likeness is strongly marked and well developed in both parents, the young will not only possess the same character as the parents, but it will possess an increased or multiplied power of hereditary transmission of these characteristics. But opposite characteristics mutually weaken each other's influence, and the offspring will have the power of hereditary transmission only in a greatly reduced degree. The exact proportion of this reduction of the power of transmission, or hereditary power, may not be precisely like that stated by Professor Tanner; but it will correspond with it in the main, and sufficiently for illustration.

These are a few general and well-established principles which have been arrived at by the most skillful and scientific breeders during the last half or three-quarters of a century; and it would be idle to dispute them, or to deny their force.

We are to bear in mind also, that this capability of transmitting the qualities or characteristics from the parent to the offspring is not limited to any one peculiarity of the animal,—like the secretion of milk, the disposition to take on fat, the strength of constitution.

the likeness of figure, or the habit of growth,—but extends to all the characteristic points of the parent animal. All the peculiarities of the system, physical and constitutional, are very largely within our control; and the character which results will be governed by the tendencies of the parents we select to breed from, and will depend on the adjustment of the balance of qualities, sometimes inclining to the side of one parent, and sometimes to the other, according to the respective power of transmission which has been spoken of.

If this power largely preponderates in one parent, owing to the length of time in which it has been carefully bred, or the number of generations through which it has become fixed and intensified, while it has been broken and weakened in the other by cross or promiscuous breeding, the character of the offspring will be governed almost exclusively by the parent that has the stronger blood; while the other will have but slight influence over the qualities of the offspring. But if there is a more even adjustment of this power of transmission on the part of the parents,—that is, if they are nearly or quite equally well bred,—the dam will succeed in imparting some peculiarities, and the sire will communicate others. The dam may impart the general form of the body, for instance, but be unable to control or overcome the stronger power of the sire over certain points of the body. The dam, for example, might have slightly deficient hind-quarters, and the sire a strong tendency to impart a good hind-quarter; and in this respect she would be compelled to yield to the superior strength of influence. In those points of character or features where they correspond, or were similar, both being good or both being bad, the result would be to increase and intensify such points, and to reproduce them in a still stronger form. In some particulars the influence of the male will predominate; in others, that of the dam.

So it will be seen that the hereditary qualities of long and carefully bred stock will represent the maximum of good qualities and the minimum of undesirable ones.

We have seen that the choice of the male to breed from is of special importance, because of the great extent of his influence; that is, the very large number of his offspring in proportion to that of the female among our domestic animals. But it is well established now that the influence of the male imparts vigor of body and general conformation of the system especially of the forward parts, and that he transmits to his progeny the qualities of the mother by which he was born. A well-bred bull dropped by a first-class dairy cow will produce a calf that will make, if a heifer, another good dairy cow. He will transmit to his daughter the qualities of his mother, if he have well fixed in his constitution the hereditary power to which reference has been made. In breeding dairy stock, therefore, it is of the utmost importance to study and know the quality of the stock from which the male has descended.

**Prepotency of Transmission.**—Whenever the offspring strongly resemble one of the parents, instead of being intermediate between them, such a progenitor is said to be prepotent in transmitting its likeness. The famous bull 'Favorite,' so frequently referred to in Shorthorn pedigrees, was remarkably prepotent in transmitting his characteristics to the Shorthorn race. The noted horse, 'Justin Morgan,' whose influence to this day is so strongly impressed upon the horses in some parts of New England, possessed this prepotent power in a remarkable degree; also Messenger, Rysdyk's Hambletonian and other well-known progenitors that might be mentioned. Breeders of horses cannot fail to have observed that some mares will transmit their characteristics with almost absolute certainty, while others of equally pure blood will produce invariably colts bearing the character of the sire.

It is stated by Godine that a ram of a goat-like breed from the Cape of Good Hope produced offspring that could be scarcely distinguished from himself when crossed with ewes of twelve other breeds, which showed that this animal possessed the prepotent force in a remarkable degree.

Mr. Brent, an English author, gives an instance of remarkable weakness in transmission

in the breed of pigeons known as "trumpeters," which is characterized by a tuft of feathers over the beak, by a crest on the head, and a very peculiar coo. In crossing a trumpeter with another breed of pigeons, and then recrossing the mongrels with trumpeters, he found it was only at the fourth generation, and when the birds had fully fifteen-sixteenths trumpeter blood in their veins that the tuft appeared, and even then, the peculiar trumpeting coo was absent. Sometimes certain peculiarities will be transmitted much more forcibly than others, an example of which is given in the following incident as narrated by a correspondent of one of our monthly journals:

"Several years ago a ship was wrecked near the Barnegat Bay (New Jersey) lighthouse. A male cat, with a bob-tail about an inch long, got ashore alive from the wreck, and, in process of time, the cats in that vicinity began to give birth to kittens with bob-tails. A male descendant of this cat is kept by one of my neighbors, about twenty miles distant from the Barnegat lighthouse. What portion of the blood of the original he may have in him, no one knows, but probably not over one-fourth to one-eighth. His color is calico, that is spotted, yellow and white.

I have a female cat of the Angora breed, which is nearly all white—only a few grey spots on it. The tails of this breed of cats are extra long, and quite bushy, something like those of the fox. Last June this cat was crossed by the above bob-tailed one, and the produce was five kittens, four of them having the form and color of the mother, and one only showing a little yellow of the sire mixed with its grey and white. But the curiosity of the thing is that, notwithstanding the long bushy tail of the mother, every one of the kittens came with a bob-tail, not exceeding an inch in length.

It is frequently asserted by breeders that the male is prepotent over the female in transmitting certain characteristics, but this rule holds good to only a limited extent, the respective influence of the sire and dam being modified according to certain conditions, which have already been pointed out. Even among animals equally pure in breed, and equally desirable as far as can be discerned by the external appearance, there will frequently be found a great difference with respect to their ability to transmit these characteristics and enstamp them, as it were, upon their progeny. Besides, in speaking of animals that are prepotent in transmitting their qualities, good breeders commonly term them "getters of their kind." When such an animal has been tested, it should be kept for breeding purposes as long as practicable, since their services, having been well tested, are known to be much more valuable than those possessing this power in a less degree.

**The Animal and the Pedigree.**—We have already given the most important general principles from which the judgment of each breeder will enable him to deduce many details to be applied in practice, the first and most obvious of which is to breed only from the best animals, not merely those that strike and fill the eye the most completely, but from those that have the hereditary power, the capacity to transmit their good qualities in the highest degree to their offspring, and the strongest evidence of this power will be the length and perfection of their pedigree, showing the qualities of the ancestors for some generations back, unless, indeed, some of their stock can be seen to tell as plain a story to the practiced eye of a judge of stock.

We have often heard practical men, intelligent men, who profess to know something about stock, and who ought to know better, say, "I don't care anything about your pedigree; let me see the animal, and I can tell whether I want to breed from him or not." Let us not deceive ourselves by any such assumption, from whatever source it may happen to come. It will be sure to lead to frequent disappointment; for, an animal may possess almost faultless form, and strike the eye of even the most experienced judge as possessing remarkably fine qualities, and indeed really possess them, and yet have no fixity of type, no great heredity of power; when, if put to a low or ill-bred female, he will be more likely than not to get poor

stock, or, at any rate, there will be no reasonable certainty of transmitting his own qualities. The importance of the greatest care in the selection of the male will be apparent from the fact that his influence extends to a far more numerous progeny. He should not only possess in the highest degree the good qualities sought after in the class of animals to which he belongs, but he should possess the power of transmitting them in the highest degree; and as this power is latent or hidden, and does not appear to the eye, it is to be judged either from the stock already got, or more commonly from the qualities of his ancestors through several generations.

And here again the quality of the pedigree—that is, the quality of the ancestry—is more important than its length. It is of little use or satisfaction to trace a pedigree back through inferior or ill-bred stock, except as a warning against the use of the male at the end of it. At the same time, the longer the pedigree the better, provided it shows a high character in the ancestry; for we have seen that the hereditary power, or capacity for transmission, is cumulative; that is, it becomes stronger and more intense and fixed from generation to generation where the respective parents possess similarity of characteristics, as is commonly the case in our well-established breeds.

It must, however, be remembered that we are not to rely on pedigree alone, but to select the *best* animals of pure blood for breeding purposes, since all pure-bred animals differ more or less in these qualities, some being much more desirable than others.

**Inbreeding.**—"In-and-in" breeding, as it is commonly termed, must of necessity be practiced to a certain extent in establishing a new breed, but when carried too far, the tendency is to lessen the size and vigor of the animal, as well as the prolificness of the progeny; hence close inbreeding has a tendency to induce sterility, while crossing is generally regarded by breeders as resulting in infusing vigor and hardiness.

With respect to the practice of breeding in-and-in, many conflicting opinions have been expressed; and the general conclusion arrived at is, that it is safe only within certain narrow limits, and then only under the hands of the skilful breeder.

Breeding in-and-in is commonly understood as an indefinite term applying to any near relationship; but its legitimate and proper application is to designate animals of the same blood as own brother and sister. But a son is only half the blood of his mother, and a daughter is only half the blood of her father. You may breed such relationship together to a certain extent without injury; that is, you may breed a bull to his mother or to his daughter, and greatly concentrate the hereditary power in the offspring. But even this course is to be followed with care and judgment, and not pursued too far. After reaping the first advantages to be derived from it, the breeder will do well to stop and consider. Breeding in-and-in, that is, own brothers and sisters, will give a more perfect form; but, if carried beyond one generation, it will be at the certain sacrifice of size, and perhaps of the strength of constitution. It greatly weakens the reproductive powers, and often leads to other and still more serious evils. Bear in mind that we refer to own brothers and sisters. More distant relationships can be put together with less risk, of course, and, if carefully watched to discover the least injury to the vigor of constitution, this course may be adopted to some extent where the design is to bring up a pure herd having certain highly important qualities which it is desirable to concentrate and perpetuate. At the same time, it should be borne in mind that pure-bred animals have now become so common and so numerous, that it will not be difficult to change the strain of blood sufficiently often to avoid any necessity of breeding from too near relationships. The necessity of breeding from close affinities will therefore rarely exist, except for the purpose of trying to build up a new breed, where, in some instances, it may be unavoidable.

Mr. Cheever, editor of the *New England Farmer*, gives a rare instance of inbreeding practiced for a number of years without any manifest injurious results. Mr. Levi Ballou, of

Woonsocket, R. I., commenced breeding the improved Suffolk pigs more than twelve years ago from two animals of this breed which he bred without taking in any new blood, breeding in every conceivable way,—mother and son, father and daughter, and brother and sister,—and raised an average of about one hundred and ten pigs per year; in ten years raising eleven hundred. Among those eleven hundred pigs there has not been one that was deformed,—every one has been perfect.

Mr. Cheever says respecting this case: “Perhaps I ought to state that this gentleman has a theory of his own. He always keeps a male for the service of his neighbors, but he never allows his neighbors’ animals to be served until he has done using him himself. His breeders are kept in the very best health possible, with his knowledge and ability, and after he has used them himself, then his neighbors have the advantage of them. He accounts for his success in that way. That is a case of more thorough inbreeding than almost any other I know of in the country.”

This is certainly a very exceptional case, for even in ordinary breeding it is unusual to raise a hundred pigs without having deformities of some kind; and more especially are such deformities liable to occur in close inbreeding.

**Crossing.**—Cross-breeding is the coupling of two animals of different and distinct breeds. The use of a pure-bred male upon a mongrel or grade female is not a case of crossing, but the term is frequently used, as between two strains of blood, or two families of the same breed. It frequently happens that the breeder may be desirous of engrafting a certain peculiar excellence of one breed or strain of animals upon another. As a general rule, the more widely the two breeds or strains differ, the more variable will be the offspring of parents thus crossed, since there will be a peculiar tendency to reversion, and the hereditary force is weakened, while the nearer alike the two breeds crossed, the less variable will the offspring be, and the easier will it be to breed true to the general characteristics. It is a noticeable fact, that the second, third, and often several successive generations, will prove more variable when mongrels or grades are bred, than the offspring of the first cross. Dr. Sturtevant says in this connection:

“In crossing animals of the same race we have a union of forces under the laws of breeding, but on account of our little knowledge concerning the relative strength and the combined action of the forces we are using, the results are apt to be exceedingly variable. When two forces meet in antagonism, each is modified and changed according to the law of mechanics, but neither force is obliterated; the effect of the struggle remains, while the forces may be in abeyance. Like the circular ripple of the pebble dropped in the water of smooth surface, the effect is ever acting, ever extending, and we thus have a series of actions modifying changes for all time. Characters in an animal are never obliterated, but may disappear from our view. We have, in crossing, a means for the modification of race, by producing changes through direct antagonism of force. We also have in free crossing a means for the preservation of uniformity between members of the same race. Like a two-edged sword, the law of crossing cuts both ways, according as its principles are applied, and under the government constantly of the great law of nature,—that of the persistence of force. As the antagonism of forces may be considered in the light of a mutual absorption, other forces, too weak to otherwise appear in a form recognizable to us, may appear. Hence, we say, that crossing produces a tendency to *reversion* or *atavism*.”

In crossing and grading up, always use a *thoroughbred male*, and the purer the blood of the female, the better. A thoroughbred male upon low-bred animals always produces good results, but a low-bred or grade male upon any kind of stock whatever, will result in disappointment. Therefore never use a male grade in breeding, no matter how fine an animal he may be to look at, for he will not transmit his good qualities with any degree of certainty, but will be very likely to transmit the undesirable qualities of his ancestors. The rule for

every breeder to follow is,—always breed from the best specimens of the best-bred families, if success be expected, and always use a thoroughbred male.

**Age for Breeding.**—As a general rule, the female can be successfully used for breeding purposes at a considerably earlier age than the male. Her growth will necessarily be retarded somewhat by the consequent drain upon her system of maintaining the fœtus during the growing period, but this can be counteracted afterward by liberal feeding. Immature males will be liable to produce weak and feeble offspring, and weakness in the offspring tends to degeneracy of the breed; besides, if a male have his powers unduly taxed at an early age, they will be enfeebled for service in after years; hence his usefulness as a breeder will be greatly impaired. Where size is desired, as a general rule, breed from mature animals; but for milk production in all animals, early breeding is necessary.

In breeding for the dairy, we believe in bringing early maturing heifers in at two years old; for the reason that, at that age, the organs of secretion, like all parts of the body, are in a more pliant condition than they will be at a later period, and they are consequently more readily influenced. The secretion of milk is well calculated to develop them, and to enlarge them to their utmost capacity. If the animal is to become a large milker when she arrives at maturity, she must have abundant room to lay away large supplies of milk; and the capacity for holding these supplies must be created while her system is pliant, elastic, and easily influenced.

Let the heifer be served towards the end of July, in August, or early in September, if she will, and you bring the parturition in the following spring, at a time very favorable for the production of milk. In spring the grasses are green, abundant, and tender, full of rich milk-producing juices, which cause the largest development of the milk-forming organs.

If, on the other hand, the first parturition of the young heifer takes place in winter, the distention of the udder on dry forage is slight, and the product in milk corresponds. The milk glands will have but slight development. Soon this habit will become a second nature, so to speak, which no amount of feeding can wholly correct. The external signs of a good milker may be there; but the yield does not come up to the production which they indicate; and this fact will often explain an apparent exception to the established rules. We do not hesitate to say, that, in our opinion, a heifer coming in in May or June, and properly treated, will be worth a great deal more as a dairy cow than one coming in with her first calf at any other season of the year.

So far as our observation has gone (and the experience of the best dairymen will coincide), a heifer coming in at two years old,—if properly fed, carefully milked, forced up, if you please, to her utmost capacity of production, and made to hold out almost till the new milk springs for a second calf, will invariably make a better milker than one coming in at three years old. Of course, this supposes that the animal, as a calf, has been well fed, and kept in a thriving condition up to the age of a year or fifteen months, when she may be served. She should have a fair development and good growth, and it is better that she should be mated to a small, rather than a large bull. The draught on her system for the nourishment of the fœtus will be less severe than if she is fecundated by a large, over-grown bull.

Besides stimulating the mammary glands to great activity, and enlarging their capacity at this age, there is the additional advantage that the animal is more easily handled, usually more docile; she may be better managed; and she arrives at her maturity of production (which is not till after the third calf) a year earlier, so that a year is gained in her profit.

To offset these great and manifest advantages, there is the liability to some check in her growth and size, as previously stated, owing to the strain upon her system before it has reached its full development. This may be guarded against and counteracted by liberal and judicious feeding; and with this there will be no appreciable difference in size and thrift

between such an animal and one brought in at three years old, when they reach the age of four or five.

Asto the age of the bull when put to service, our theory and practice are widely different; for, while most intelligent farmers are ready to admit that one year is too young,—that the system is not mature, that the animal is not developed, and ought not to be used,—they do, in fact, use yearling bulls far more commonly than older ones. If well fed and thrifty, we should not object to a limited use of a bull at fifteen months, and from eighteen months and onward more freely, in getting dairy stock and stock for beef. For getting working cattle, or animals for labor, the bull should be at least two years or two years and a half old. The bull is better to be worked; and, if it were our custom to use all our bulls more or less in the yoke, they would undoubtedly be all the better for it.

The age at which different animals should be bred will vary according to their maturing qualities, and other conditions, a subject which has already been treated in connection with the separate description, etc., of different kinds of farm stock. We have aimed in this connection to give some of the more important general rules and principles in the art of breeding, especial directions being found in connection with each special department of domestic animals.

**Controlling the Sex of Offspring.**—There has been much controversy on this subject, and many experiments have been cited to prove the opposing theories advanced. The subject of producing either sex at will interested the ancients as well as the present generation, and many rules denominated infallible were laid down by them, some of which were most whimsical and ridiculous. According to Professor Thury of Geneva, Dr. Naphy, and other eminent authorities, when conception takes place in the early stage of the period of the oestrus termed “heat,” the result is a female, but if conception takes place late in this period, or when it is passing off, the result is a male. This theory has gained much favor, yet numerous instances from equally reliable authorities might be cited to prove precisely the reverse in results. Darwin states in reference to this view of the subject, that recent observations discountenance it.

Dr. Sturtevant says respecting it: “In my own experiments in this direction, I have obtained no confirmation, and I know of careful and reliable men who claim good results from the same theory in an exactly opposite direction, viz., that the first signs of heat influence a male conception, the last a female conception.

Prepotency seems one of the best determined incidents recorded in this relation. ‘In several species of domesticated or cultivated animals (I believe in all),’ writes Thomas Knight, ‘particular females are found to produce a very large majority, and sometimes all their offspring, of the same sex; and I have proved repeatedly that by dividing a herd of thirty cows into three equal parts, I could calculate with confidence upon a large majority of females from one part, of males from another, and upon nearly an equal number of males and females from the remainder. I frequently endeavored to change these habits, by changing the male, but always without success; and I have in some instances observed the offspring of one sex, though obtained from different males, to exceed those of the others in the proportion of five or six, and even seven, to one.’ My own experience in the ‘Wauashakum Herd’ of Ayrshires is confirmatory of this statement, as are also the materials relating to births gathered with great labor from the Ayrshire Herd Book.”

Dr. George Watt, of Ohio, an old physician and extensive breeder, after experiments extending over a period of fifty years, also arrives at an opinion directly the opposite of that of Professor Thury.

Notwithstanding the vast number of experiments that have been tried to ascertain the law which governs the sex of animals, no satisfactory result has been obtained. But it has been observed that the most vigorous parent will generally govern the sex; that is, that the

probabilities are, that the sex will take after the stronger, more robust parent. Thus, a feeble cow, or too young a one, or one too old (past her prime), fecundated by a vigorous bull, will most generally bring a bull calf; but the reverse will happen if the inferiority is on the side of the bull.

Thus, at the Agricultural College at Grignon, visited by the editor of this work a few years ago, forty-six parturitions of young heifers with their first and second calves, brought twenty-nine bulls and seventeen heifers; while twenty-eight parturitions of older cows, in their full vigor of maturity, brought eighteen females and ten males. So, at the Agricultural Institute at Hohenheim, which we also visited, a hundred and forty parturitions of young cows brought eighty males and sixty females; while older cows have always brought more females than males.

And so, if you put a cow that has recently calved, while still rather feeble, to a vigorous bull, the product will almost invariably be a male. A good dairy cow, with her strength of constitution constantly taxed, will bring more males than females, unless special pains are taken to increase her constitutional vigor by extra care and feed.

Dr. James Law, in an exhaustive treatise on this subject, sums up the results of his investigations, in the following conclusions: 1. "That while we cannot deny an occasional manifestation of the power of the maternal mind in determining the sex of the product of conception, yet this is only operative in a limited number of individuals, and cannot generally be availed of by the breeder, but is ever to be borne in mind as something to be guarded against as being a possible source of failure, on his part, to control sex.

2. Serving the female when her udder is full, may have a slight influence in producing female offspring, but only in exceptional cases, as it operates only through the mental impressions.

3. No confidence whatever is to be placed in any theory or plan based on a special point of origin for the spermatic artery, on the development of the impregnating fluid in the right or left testicle, or of the embryo in the right or left side of the womb.

4. The resort to sires and dams that breed mainly to one sex, is very plausible in theory, but as yet entirely unsupported by facts. Then again, if successful, it will fix in the breed a quality which a change of market may soon render a most undesirable one.

5. The doctrine of the regular alternation of sex in the ova successively matured, is not in harmony with some other physiological facts, and will require more extended and definite proof of its truth than has yet been furnished.

6. The doctrine of the female nature of the immature ovum, and of the male character of the ripe one, has many physiological considerations in its favor, and as applied to the uniparous animals, is supported by an array of facts that would warrant its adoption wherever it can be consistently carried out.

7. That the maturity, strength, and vigor of the one parent has a great influence in determining its own sex in the majority of the progeny, while early youth, old age, weakness, debility, and exhaustion, lessens this prepotency, and allows a preponderating influence to be exercised by the other sex. That generous feeding of the dam, with rest, greatly favors the generation of females, while a poor diet favors the production of males.

8. That although the general tendency is to strike a fair balance between the male and female progeny, yet this, like all other physiological laws, will bend somewhat to the circumstances in which the race happen to live. Thus, under rich feeding, abundance, and ease, there is a stimulus given toward the production of females and the rapid increase of numbers. Conversely, under poor feeding and privation, the tendency is toward an excess of males, and the reduction of the race to proportions more in keeping with their supply of food. Again, when a great excess of males exists, it tends to correct itself by earlier impregnations, the generation of females, and a restoration of the balance of the sexes. Such laws having been ascertained, it is open to us to avail ourselves of them as of the other laws of reproduction.

9. That in seeking, by any method, to control the production of the sexes, we must bring as many conditions (laws) as possible to favor our purpose, and carefully obviate all known sources of fallacy, otherwise we may reach very unsatisfactory results and unfair conclusions. Thus, while avoiding, as far as possible, the disturbing influences of the imagination, and of animals that have shown an unconquerable disposition to produce one sex only, and while securing the desired relative conditions of age, health, and vigor on the part of sire and dam, we should attend to the necessary feeding, to the securing of early or late impregnation of the ovum, as the case may demand, and to any other circumstance that would promise to influence the result."

Numerous as are the theories advanced, and diverse as are the opinions entertained respecting this subject, it is still involved in much mystery, and is seemingly one of the secrets which Nature has thus far refused to fully disclose to man. The question that concerns the securing of male or female offspring at will, is one of great interest and importance to stock breeders, especially to breeders of high-class animals, and to owners of fancy strains of blood, individuals of which command extravagant prices, and where it would be desirable to secure a large preponderance of females, by which means valuable stock may be the more speedily multiplied. It is to be hoped that as intelligence increases, and as this subject becomes more thoroughly investigated and understood, information will be obtained which shall lead to the establishment of definite and reliable rules for the breeder, by which he can influence the sex of the offspring as desired.

**Influence of the First Impregnation on the Dam.**—The influence which the sire has upon the dam on her first impregnation, extending as it frequently does to subsequent impregnations by other males, is a mysterious one, and shows the importance of giving special attention to the quality of the sire giving the first impregnation, especially where pure-bred stock are desired. There seems to be an impression made upon the nervous system of the dam in many instances by the first conception, that will cause the likeness of the first sire to be enstamped upon the future progeny, irrespective of the quality of the males subsequently used. Thus mares have been known to entail the likeness of the sire of her first colt upon her colts for three or four generations, when bred to other horses. A well-known and remarkable instance of this kind occurred in the breeding of an Arabian mare to a Quagga, an animal resembling the Zebra.

The Earl of Morton, being desirous of obtaining a breed between the horse and the quagga, selected a young seven-eighths Arabian mare and a fine quagga male, and the produce was a female hybrid. The same mare had afterwards a filly and then a horse-colt by a fine black Arabian horse. Both resembled the quagga in the dark lines along the back, and the stripes across the forehead, and the bars across the legs. In the filly the mane was short, stiff, and upright, like that of the quagga; in the colt it was long, but so stiff as to arch upwards, and hang clear of the sides of the neck.

Mr. William Goodwin, veterinary surgeon to Her Majesty, states that several of the mares in the royal stud, at Hampton Court, had foals in one year, which were by Actæon, but which presented exactly the marks of the horse Colonel, a white hind-fetlock, for instance, and a white mark or stripe on the face; and Actæon was perfectly free from white. The mares had all bred from Colonel the previous year.

Alexander Morrison, Esq., of Bognie, had a fine Clydesdale mare which, in 1843, was served by a Spanish ass and produced a mule. She afterward had a colt by a horse, which bore a very marked likeness to a mule—seen at a distance, every one set it down at once as a mule. The ears are nine and a half inches long, the girth not quite six feet, and stands above sixteen hands high. The hoofs are so long and narrow that there is difficulty in shoeing them, and the tail is thin and scanty.

A pure Aberdeenshire heifer was served with a pure Teeswater bull, by which she had a

first-cross calf. The following season the same cow was served with a pure Aberdeenshire bull; the produce was a cross-calf, which, when two years old, had very long horns, the parents being both polled.

Mr. Shaw, of Leochel-Cushnie, put six pure-horned and black-faced sheep to a white-faced hornless Leicester ram, and others of his flock to a dun-faced Down ram. The produce were crosses between the two. In the following year they were put to a ram of their own breed, also pure. All the lambs were hornless and had brown faces. Another year he again put them to a pure-bred horned and black-faced ram. There was a smaller proportion this year impure; but two of the produce were polled. One dun-faced, with very small horns, and three were white-faced—showing the partial influence of the cross even to the third year. A small flock of ewes belonging to Dr. W. Wells, in the island of Grenada, were served by a ram procured for the purpose—the ewes were all white and woolly; the ram was quite different—of a chocolate color, and hairy, like a goat. The progeny were of course crosses, but bore a strong resemblance to the male parent. The next season Dr. Wells obtained a ram of precisely the same breed as the ewes, but the progeny showed distinct marks of resemblance to the former ram in color and covering.

Darwin cites the following case: A sow of Lord Western's black and white Essex breed was served by a wild boar of a deep chestnut color, and the pigs partook of the appearance of both sire and dam, some of them being strongly marked by the chestnut color of the sire. After the boar had long been dead the sow was served by a boar of her own black and white breed,—which are remarkable for breeding true, and never show any chestnut color,—but from this union the pigs produced were many of them strongly marked with the same chestnut color that characterized the first litter. This influence is not always perceptible, but is very liable to appear, hence caution should be used in this respect in breeding pure-bred stock. Professor Agassiz has expressed the opinion that the influence of the first male impregnating the dam is so great, that the chances are that every young of that dam afterwards will possess some of the characteristics of the first male that served her.

But not only will the first impregnation, but mental impressions received by the female during the period of the œstrum or heat, be likely to affect the offspring, and often to a very remarkable degree.

A Mr. Mustard of Angus, in Scotland, had a cow that came in heat while at pasture in a field bounded by one belonging to a neighbor, out of which an ox jumped, and went with the cow till she was brought home to the bull. The ox was white with black spots, and horned. The cow and the bull were not only hornless, but there was not a horned beast on the place, nor one with any white on it, the polled Angus breed being jet-black. But the calf in the following spring was black-and-white and horned.

A curious case is related of a Dr. Hugh Smith who was traveling in the country with a favorite female setter, when the bitch became suddenly enamored with a mongrel cur that followed her till he was obliged, in order to separate them, to shoot the cur. The image of this sudden favorite, however, still haunted the bitch, and for some weeks after she pined excessively, and obstinately refused intercourse with any other dog. At length she admitted the caresses of a well-bred setter; but, when she whelped, the doctor was mortified with the sight of a litter which he perceived bore evident marks, particularly in color, of the favored cur, and they were all destroyed. The same also occurred in her future litters: invariably the breed was tainted by the lasting impression made by the mongrel. The mental impressions received at the time of the heat are sufficient to stamp the progeny. We cannot be too careful to select the associates we keep with our pure-bred stock.

**Breeding of Animals in a Wild State.**—The animal in a wild state, or in a state of nature, has stronger reproductive powers, greater energy of the system and constitution, than one long under the influence of domestication, the natural laws being to some extent

interfered with by the efforts we have to make to establish and perpetuate certain peculiarities of the animal system, the extraordinary development of which is unnatural and artificial, but which development may be essential to our interests. The tendency to secrete milk, for instance, is a natural one, found in all animals that suckle their young; but the extraordinary development of milking powers is *artificial*. In the wild state the cow yields milk for only a short time, and that only in sufficient quantities, probably, to nourish her young.

In a wild state among gregarious animals, the strongest male leads the herd, taking his choice from it during his vigor, to be again and again succeeded by other strong males; hence, among such animals the same sire will often be found for two or three successive generations. A traveler in South America tells of seeing an immense and aged spotted bull, that was known by the inhabitants of that locality to have sired the wild herd for three generations, and who bore the scars of many a hard fought battle. Darwin maintains that a system of influences not wholly unlike those which man brings to bear in the breeding of animals, is found in the circumstances with which they are often surrounded in a state of nature. It is well-known, however, that, like savage tribes, wild animals are subject to but few diseases, and that artificial surroundings, artificial living and methods of breeding, have a tendency to produce diseases unknown in a state of nature. Animals that are confined much of the time in close, ill-ventilated stables, are more liable to disease than those that are much of the time in the open air; hence, farm animals in the country are less susceptible to disease than those in city stables, where the life of the horse, for instance, is wholly an artificial one. The same might be said of artificial breeding, as previously shown.

As we recede therefore from this wild condition by domestication, and subject the animal to a variety of circumstances which modify form and system, we frequently do it at the expense of certain qualities, for the sake of gaining other qualities better calculated to promote our immediate interest. The reproductive powers become weaker, the vitality and vigor of constitution lessened; but the formation of fat, or the tendency to produce meat, and the profitable production of milk, may be largely increased. That high breeding has this tendency to diminish the vital force and strength of constitution, is apparent enough when we consider how utterly absurd it would be to attempt to pit an improved Short-horn bull against a rough and ill-bred bull in a Spanish arena. The former would have the improvement knocked out of him before he had time to turn round.

## BREEDING CALENDAR.

**T**HE following breeding calendar will be found of value in determining the period of gestation of different kinds of farm stock; that of mares being usually 340 days; cows 285 days; ewes 154 days, and swine 130 days. The column of dates at the left denotes the time of service, and applies to the other columns as follows: for instance, if a mare be served January 1st, her period of gestation being 340 days will bring the time of her parturition to December 6th; if served January 6th, the time of foaling will be December 11th, and so on. A cow served January 1st will drop her calf October 12th; a ewe served at that time will drop her lamb June 3d; a sow April 30th, etc. Of course slight variations may result from various causes, but the dates given will be found to cover the usual period of gestation.

## BREEDING CALENDAR.

| Covering.         | Mares 340 Days.   | Cows 285 Days.    | Ewes 154 Days.    | Swine 130 Days.   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| January 1 .....   | December 6 .....  | October 12 .....  | June 3 .....      | April 30 .....    |
| 6 .....           | 11 .....          | 17 .....          | 8 .....           | May 5 .....       |
| 11 .....          | 16 .....          | 22 .....          | 13 .....          | 10 .....          |
| 16 .....          | 21 .....          | 27 .....          | 18 .....          | 15 .....          |
| 21 .....          | 26 .....          | November 1 .....  | 23 .....          | 20 .....          |
| 26 .....          | 31 .....          | 6 .....           | 28 .....          | 25 .....          |
| 31 .....          | January 5 .....   | 11 .....          | July 3 .....      | 30 .....          |
| February 5 .....  | 10 .....          | 16 .....          | 8 .....           | June 4 .....      |
| 10 .....          | 15 .....          | 21 .....          | 13 .....          | 9 .....           |
| 15 .....          | 20 .....          | 26 .....          | 18 .....          | 14 .....          |
| 20 .....          | 25 .....          | December 1 .....  | 23 .....          | 19 .....          |
| 25 .....          | 30 .....          | 6 .....           | 28 .....          | 24 .....          |
| March 2 .....     | February 4 .....  | 11 .....          | August 2 .....    | 29 .....          |
| 7 .....           | 9 .....           | 16 .....          | 7 .....           | July 4 .....      |
| 12 .....          | 14 .....          | 21 .....          | 12 .....          | 9 .....           |
| 17 .....          | 19 .....          | 26 .....          | 17 .....          | 14 .....          |
| 22 .....          | 24 .....          | 31 .....          | 22 .....          | 19 .....          |
| 27 .....          | March 1 .....     | January 5 .....   | 27 .....          | 24 .....          |
| April 1 .....     | 6 .....           | 10 .....          | September 1 ..... | 29 .....          |
| 6 .....           | 11 .....          | 15 .....          | 6 .....           | August 3 .....    |
| 11 .....          | 16 .....          | 20 .....          | 11 .....          | 8 .....           |
| 16 .....          | 21 .....          | 25 .....          | 16 .....          | 13 .....          |
| 21 .....          | 26 .....          | 30 .....          | 21 .....          | 18 .....          |
| 26 .....          | 31 .....          | February 4 .....  | 26 .....          | 23 .....          |
| May 1 .....       | April 5 .....     | 9 .....           | October 1 .....   | 28 .....          |
| 6 .....           | 10 .....          | 14 .....          | 6 .....           | September 2 ..... |
| 11 .....          | 15 .....          | 19 .....          | 11 .....          | 7 .....           |
| 16 .....          | 20 .....          | 24 .....          | 16 .....          | 12 .....          |
| 21 .....          | 25 .....          | March 1 .....     | 21 .....          | 17 .....          |
| 26 .....          | 30 .....          | 6 .....           | 26 .....          | 22 .....          |
| 31 .....          | May 5 .....       | 11 .....          | 31 .....          | 27 .....          |
| June 5 .....      | 10 .....          | 16 .....          | November 5 .....  | October 2 .....   |
| 10 .....          | 15 .....          | 21 .....          | 10 .....          | 7 .....           |
| 15 .....          | 20 .....          | 26 .....          | 15 .....          | 12 .....          |
| 20 .....          | 25 .....          | 31 .....          | 20 .....          | 17 .....          |
| 25 .....          | 30 .....          | April 5 .....     | 25 .....          | 22 .....          |
| 30 .....          | June 4 .....      | 10 .....          | 30 .....          | 27 .....          |
| July 5 .....      | 9 .....           | 15 .....          | December 5 .....  | November 1 .....  |
| 10 .....          | 14 .....          | 20 .....          | 10 .....          | 6 .....           |
| 15 .....          | 19 .....          | 25 .....          | 15 .....          | 11 .....          |
| 20 .....          | 24 .....          | 30 .....          | 20 .....          | 16 .....          |
| 25 .....          | 29 .....          | May 5 .....       | 25 .....          | 21 .....          |
| 30 .....          | July 4 .....      | 10 .....          | 30 .....          | 26 .....          |
| August 4 .....    | 9 .....           | 15 .....          | January 4 .....   | December 1 .....  |
| 9 .....           | 14 .....          | 20 .....          | 9 .....           | 6 .....           |
| 14 .....          | 19 .....          | 25 .....          | 14 .....          | 11 .....          |
| 19 .....          | 24 .....          | 30 .....          | 19 .....          | 16 .....          |
| 24 .....          | 29 .....          | June 4 .....      | 24 .....          | 21 .....          |
| 29 .....          | August 3 .....    | 9 .....           | 29 .....          | 26 .....          |
| September 3 ..... | 8 .....           | 14 .....          | February 3 .....  | 31 .....          |
| 8 .....           | 13 .....          | 19 .....          | 8 .....           | January 5 .....   |
| 13 .....          | 18 .....          | 24 .....          | 13 .....          | 10 .....          |
| 18 .....          | 23 .....          | 29 .....          | 18 .....          | 15 .....          |
| 23 .....          | 28 .....          | July 4 .....      | 23 .....          | 20 .....          |
| 28 .....          | September 2 ..... | 9 .....           | 28 .....          | 25 .....          |
| October 3 .....   | 7 .....           | 14 .....          | March 5 .....     | 30 .....          |
| 8 .....           | 12 .....          | 19 .....          | 10 .....          | February 4 .....  |
| 13 .....          | 17 .....          | 24 .....          | 15 .....          | 9 .....           |
| 18 .....          | 22 .....          | 29 .....          | 20 .....          | 14 .....          |
| 23 .....          | 27 .....          | August 3 .....    | 25 .....          | 19 .....          |
| 28 .....          | October 2 .....   | 8 .....           | 30 .....          | 24 .....          |
| November 2 .....  | 7 .....           | 13 .....          | April 4 .....     | March 1 .....     |
| 7 .....           | 12 .....          | 18 .....          | 9 .....           | 6 .....           |
| 12 .....          | 17 .....          | 23 .....          | 14 .....          | 11 .....          |
| 17 .....          | 22 .....          | 28 .....          | 19 .....          | 16 .....          |
| 22 .....          | 27 .....          | September 2 ..... | 24 .....          | 21 .....          |
| 27 .....          | November 1 .....  | 7 .....           | 29 .....          | 26 .....          |
| December 2 .....  | 6 .....           | 12 .....          | May 4 .....       | 31 .....          |
| 7 .....           | 11 .....          | 17 .....          | 9 .....           | April 5 .....     |
| 12 .....          | 16 .....          | 22 .....          | 14 .....          | 10 .....          |
| 17 .....          | 21 .....          | 27 .....          | 19 .....          | 15 .....          |
| 22 .....          | 26 .....          | October 2 .....   | 24 .....          | 20 .....          |
| 27 .....          | December 1 .....  | 7 .....           | 29 .....          | 25 .....          |
| 31 .....          | 5 .....           | 11 .....          | June 2 .....      | 30 .....          |

**Important Facts for Farmers.**—In the breeding and care of domestic animals, the farmer should remember that it is not alone in the breed as such that success lies, but in both breeding by careful selection—always aiming to maintain and improve the desirable characteristics—and in generous feeding, kind treatment, and good care generally. A half-starved animal, unsheltered from the storm and obliged to shift for himself, will not be likely to maintain and perpetuate the valuable qualities he may originally have possessed, no matter how choice the breed, or to how great an extent the fine points of that respective breed may have been represented by him. Bad management would soon degenerate the best breed that has ever been established. We must not only *breed* well, but we must *feed, shelter, and care* for generally in a manner suited to the maintaining and perpetuating of the good qualities of the breed.

Dr. A. S. Heath, President of the Farmer's Club of the American Institute, New York city, has embodied some of the first principles to be observed in the breeding and care of animals, in a recent address before that Club, from which we take a few extracts, as follows:

"The structures of animals are specially adapted to their demands and natures, and *vice versa*. A special aptitude to fatten is incompatible with ample milk production in the race of bovines; and excessive weight of body and shortness of the limbs in the horse or hog is not suggestive of fleetness. Variation is observed in the readiness of animals to adapt themselves to new conditions, and the changes it produces in them, and especially by hereditary transmission to their offspring. Cold, exposure, and neglect produce degeneration, while care, shelter, and liberal feeding improve existing animals and their expectant offspring. These good results may also be freely transmitted to the progeny. Climate modifies both animals and plants. In tropical climates, with rich soil, many of our small grasses attain a gigantic growth; and in great altitudes, with poor soil, both plants and animals are dwarfed.

By judicious breeding, care, kindness, and liberal feeding, all the animals and their products become better. Milk is richer, meat is finer, beef and mutton are more tender and juicy, the very soil becomes fat, and the tiller grows richer and richer. Generosity to man, beast, and soil is profitable. Breeding animals must be healthy, free from defects of form, free from defects of constitution, free from predisposition to disease or weakness, free from bad temper or habits, must have sound digestive organs, and they must be capable of promptly and perfectly assimilating food. The breeder must intimately know the capabilities and characteristics of his breeding animals, so as to be able to adapt them to rear young which shall answer his preconceived wants. He must know that, all other things being equal, both parents equally exert the same amount of influence upon the progeny. This presupposes the equal health, vigor, and stamina of both parents. Both should therefore be as pure-blooded and perfect as possible.

Because it has been recommended that the male animal should be most highly bred, some have attributed to him the greater potential share in the procreation. This is only true because he is the parent of many annually, while the female is the parent of one, or of only a few during the same time.

Though food, climate, soil, altitude, exposure, shelter, care, kindness, and other operating circumstances may all produce great changes, yet, all operating at the same time, and for a long time on the animal and its progeny, cannot change the species. By selection we, in time, breed small-boned animals into large-boned ones; long-legged ones into short-legged ones; we can breed horned into hornless, and light-bodied ones into heavy-bodied animals. In a word, by selection the breeder can make the black white, the white black, the fruitful barren, the deformed straight, the perfect imperfect, the imperfect perfect; he can breed to a feather; he can produce a tendency to meat, to milk, to butter, to cheese, to capacity for labor, for speed, for endurance, or to serve almost any reasonable desire, demand, or fancy. By breeding from carefully-selected parents, the breeder can rapidly increase his flocks and herds,

by choosing those of great fecundity from which to breed—ewes from families that year twins, cows that uniformly breed, sows that farrow large numbers of pigs—and it is just as essential that the males also should be selected from like prolific families and dams.

The terms "natural selection," "the struggle for existence," and "the survival of the fittest," have been freely used by Darwin and others to convey the idea of nature and methods to perpetuate her creatures. The wise breeder takes advantage of nature and methods to perpetuate the excellences which his acumen and judgment in selection have secured for the art of breeding. There are many things to be constantly borne in mind by the breeder: the laws of variation, correlation, atavism, the effect of climatic and telluric influences, care, kindness, feeding, and many other circumstances favorable or unfavorable to the modeling of form, to the production of animal products, to the perfection and perpetuation of desirable qualities, and the judgment, sagacity, and indomitable perseverance of the breeder, must often be taxed to the utmost limit of human tolerance.

Though pure-bred animals are most desirable to breed from, yet in our great herds of the West there are too few pure-blooded females to produce the vast herds and flocks imperatively demanded. We must therefore select the purest male animals to cross on our common females; and upon the best females of the first produce to breed up by the use of the same male, or one of like purity of blood. In-and-in breeding need not be feared, if the selection be judicious and the process be not too long continued. But a mistake too often committed, in careless and thoughtless breeding, is the use of grade males. Grade females are indispensable in extensive breeding; but a breeder had better mortgage, if need be, his land to secure pure-bred male stock animals than to use unreliable grades that cannot transmit with any degree of certainty the good qualities they may possess, and one too apt to transmit defects.

If size is desired, as a general rule, breed from mature animals. But for milk production, in all animals, early breeding is most essential. Cows are not profitable after eight or nine years of age for any purpose, unless they be of extraordinary excellence. Ewes cease to be at their best at the same age as cows, though, if highly bred and valuable, they may be still further bred. Mares have brought forth the most valuable foals between the ages of four and fifteen years.

Low, rich, succulent pastures are best suited for large, heavy animals; small, active animals to high, thin, dry pastures. Luxurious feeding diminishes hardness. Low, wet pastures produce big, coarse bones, and large, flat feet in horses. In the wild state, the strongest males only beget offspring. Improvement in breeding goes step by step to the highest point of excellence. Prof. Tonner has shown that the lungs and liver of highly improved breeds are considerably smaller than in those animals at perfect liberty."

The stock breeders may justly be regarded among the great wealth-producers of the country, and Collings, Bakewell, Bates, Hammond, and other eminent breeders who have been the means of improving stock to the extent that they may be said to have almost created new types of animals, should be honored as public benefactors. The interests of the breeder and the farmer are identical; and the aim of the former should ever be the real and not the fancied wants of the largest class of customers to be the beneficiaries of their skill,—the practical farmers, to whom it is an interest of great importance to secure animals that will yield the largest and quickest returns on their investments. The best animals will, as a general rule, be found the cheapest, and the aim of the breeder and farmer should be to obtain such as are best adapted to the purposes for which they are to be used.











